IDENTIFICATION OF CULTURES OF WOOD-INHABITING HYMENOMYCETES[1]

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Abstract

A multiple-choice key for the identification of cultures of 149 species of wood-inhabiting Hymenomycetes, whose cultural characters have been published previously, is based on the following diagnostic characters: presence or absence of extracellular oxidase, types of septation of hyphae, occurrence of special structures and accessory spores, color of hyphae and mycelial mats, color changes in agar, rates of growth, formation of fruit bodies, odor, host relationships, and interfertility phenomena. In the key, each diagnostic character is symbolized by a number, the Code Symbol; each species is described in abbreviated form by a Species Code, the series of Code Symbols that denote the characters shown by the species; and each section in the key is headed by its Key Code, the series of Code Symbols that denote the characters shared by all the species in the section. Most of the final sections in the key consist of a number of species with identical or similar Species Codes. In these sections, detailed descriptions of the cultural characters of the species have been inserted.

Introduction

The identification of cultures of Hymenomycetes isolated from decays in living trees, logs, or wood products is an integral part of many surveys and studies in pathology. Such identifications require the accumulation of cultures of species likely to be associated with decays, the determination of their cultural characters, and the arrangement of the species in a diagnostic key that will facilitate comparisons between the isolates to be identified and the named cultures.

In 1948 I published a key for this purpose, covering 126 species, in which each species was assigned a Key Pattern, consisting of 11 digits, each of which symbolized a character considered to have diagnostic significance (Nobles 1948). By arranging the Key Patterns in ascending numerical order a key was obtained which, within limits, was workable and expansible. As the number of cultures that I received for identification increased, reaching 2000 to 3000 per year for several years, the key, with its small number of diagnostic characters and limited expansibility, became inadequate, and a series of working keys, either general in scope or restricted to species associated with decays in certain hosts or localities, were devised.

The key published in 1948 (Nobles 1948) was completely artificial in that first divisions, based on host relationships and colors of mycelial mats, segregated groups of species without reference to natural relationships. In setting up later keys, attempts were made to select as the basis for divisions characters that had taxonomic as well as diagnostic significance. A first division based on the presence or absence of extracellular oxidase in cultures divided the species into two distinct groups (with the inevitable exceptions) and subsequent divisions within each group, based on types of septation of hyphae and the occurrence of special structures such as fiber hyphae, hyphae with walls irregularly

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thickened, hyphae with contorted, incrusted terminal cells, and so on, segregated groups in many of which the species appear to be closely related. Some groups of species so segregated coincide with established genera, such as *Coriolellus*, *Ganoderma*, and *Polyporus sensu stricto* of the Polyporaceae and *Peniophora sensu stricto* of the Thelephoraceae, while other groups, which appear to be equally homogeneous in their cultural characters, include species assigned to two or more genera in the conventional classifications. These observations led first to the conviction that cultural characters could contribute to the solution of taxonomic problems in the Hymenomycetes and then to the publication of a tentative classification of the Polyporaceae based on cultural characters (Nobles 1958*b*). In that paper the argument was presented in the form of a key which followed, in its first divisions, the same sequence as that used in the key in this paper. The 252 species of Polyporaceae included in the study were assigned to groups whose members are alike in the cultural characters and basidiospore characters which were used as a basis for segregation. Specific separation of cultures within the groups was not attempted because detailed cultural descriptions were not available for all of the species.

In the key presented here, where the purpose is the specific identification of cultures, only those species are included whose detailed cultural descriptions have been published by myself or others using the same methods, in papers cited throughout the text. Of the 149 species, 114 belong to the Polyporaceae, 21 to the Thelephoraceae, 12 to the Agaricaceae, 1 to the Hydnaceae, and 1 to the Heterobasidiomycetes. The limitations of a key which covers such a small proportion of the species likely to be encountered are obvious. However, its publication at this time seems to be justified since it provides a working tool for those involved in the identification of cultures of wood-rotting Hymenomycetes, replacing my earlier key (Nobles 1948), which is long obsolete and no longer available in reprint form, and establishes an expansible system into which additional species, as they are described, can be inserted.

Cultivation and Description of Cultures

Isolates to be identified must be grown under the same conditions as those used for growing the cultures and preparing the descriptions that are the basis for the key. The standard procedure (Nobles 1948) is to grow the cultures on malt agar, prepared according to the following formula:

Malt agar	
Difco Bacto malt extract	12.5 g
Difco Bacto-Agar	20.0 g
Distilled water	1000.0 ml

The culture is grown on malt agar in a Petri dish from a center inoculum for 1 week, and inocula, 2 to 3 mm cubes, are transferred from this actively growing mycelium to the edge of 9-cm glass Petri dishes, each containing about 30 ml malt agar, five plates being inoculated for descriptive studies, two for purposes of identification. These are incubated for 6 weeks, at room temperatures, in the dark, being brought into the light at weekly intervals for examination and description. Records are made of the radius of the colony from the side inoculum, the rate of growth being expressed as the number of weeks required by the fungus to cover the surface of the agar in the Petri dish, the form and character of the advancing zone, the color, topography, and texture of the mat, the presence or absence of fruiting bodies, the color changes in the agar induced by the growth of the fungus ("reverse"), and the odor. In addition, mycelium from the advancing zone, from the older parts of the mat, both aerial and submerged, and from fruiting areas is mounted in 5% aqueous KOH and stained with an aqueous solution of phloxine for examination and description at suitable intervals.

Up to 1958, the presence or absence of extracellular oxidase was determined by the Bavendamm test, following the procedure described by Davidson, Campbell, and Blaisdell (1938). Cultures are grown from center inocula in Petri dishes on agar made according to the following formula:

Gallic (or tannic) acid agar	
Difco Bacto malt extract	15.0 g
Difco Bacto-Agar	20.0 g
Distilled water	1000.0 ml
Gallic (or tannic) acid	5.0 g

After incubation for 1 week, the presence and intensity of diffusion zones, indicating the formation of extracellular oxidase, or their absence, indicating lack of extracellular oxidase, is recorded. Later it was found that comparable results were obtained in most species by dropping an alcoholic solution of guaiacum (0.5 g gum guaiac in 30 ml of 95% ethyl alcohol) on the mycelial mat of the growing culture (Nobles 1958*a*). The rapid appearance of blue color indicates the occurrence of extracellular oxidase; no change, or tardy appearance of a pale blue color, indicates its absence. This method has now replaced the use of gallic and tannic acid agars in diagnostic work although both tests are made when the cultural characters of a species are being determined.

The formal description of the cultural characters of a species is a compilation of the descriptions prepared for a number of isolates and so is a compromise between the precise listing of the characters observed in one isolate and the variation of those characters encountered when a number of isolates are examined. In most species, especially those which are heterothallic, the various isolates are remarkably uniform and the cultural characters of the species are readily described. In other species, notably those with brown hyphae and mycelial mats and with simple-septate hyphae, most of which are presumably homothallic, the variability shown by various isolates of a species or even by one isolate in different sectors or in successive plantings makes for great difficulty in describing and identifying cultures.

As described below, the cultural characters for each species are expressed in abbreviated form in a Species Code, in which Code Symbols, each denoting a character considered to have diagnostic value, are arranged in order.

Preparation and Organization of the Diagnostic Key

The key has been prepared with the aid of 3 × 5 inch Kwiksort Punch Cards in which the holes are numbered 1 to 63, these numbers being used as symbols for the characters that have diagnostic value in the identification of cultures of wood-inhabiting Hymenomycetes. These numbers will be referred to as Code Symbols, each denoting a precise character as defined in the list below. The series of Code Symbols that expresses the cultural characters shown by a species constitute the Species Code for that species. The Species Codes for the species included in the present paper are listed in Table I.

TABLE I

Species included in Key

Species	Species Code
abietinum (Stereum)	1.3.4.5.7.8.34.37.39.47.53.55.
abietinus (Polyporus)	2.3.8.13.32.36.38.43.44.54.55.60.
adiposa (Pholiota) (See *Pholiota aurivella)*	
adustus (Polyporus)	1.2.3.7.34.35.36.38.40.42.50.54.55.59.
albellus (Polyporus)	2.3.9.12.34.36.38.43.48.53.54.60.
albipellucida (Poria)	2.4.7.34.35.36.38.40.41.42.54.55.59.
alnicola (Flammula)	2.3.26.32.36.38.47.51.54.55.60.
alveolaris (Favolus)	2.3.8.32.36.38.40.46.54.60.
americana (Trametes) (See *Trametes odorata)*	
amorphus (Polyporus)	2.3.8.9.32.36.38.47.48.53.55.
anceps (Polyporus)	2.3.8.32.34.36.38.42.–44.48.55.60.
annosus (Fomes)	2.5.6.7.10.11.33.36.37.38.42.(47).50.53.(54).55.
applanatum (Ganoderma)	2.3.8.10.32.36.37.38.39.43.–47.54.55.60.
arcularius (Polyporus)	2.3.8.11.32.34.37.38.40.42.50.54.60.
asiatica (Poria) (See *Poria sericeomollis)*	
aurivella (Pholiota)	2.3.7.33.36.37.38.44.45.51.54.55.59.
balsameus (Polyporus)	1.2.3.7.34.36.37.38.39.44.–46.(48).52.54.55.
berkeleyi (Polyporus)	2.6.8.33.34.36.38.45.48.53.54.55.
betulina (Lenzites)	2.3.8.32.36.38.42.–44.54.55.60.
betulinus (Polyporus)	1.3.7.8.26.32.34.36.38.42.–44.(48).50.54.59.
bicolor (Odontia)	2.3.13.32.35.36.40.43.–46.54.55.58.
biennis (Polyporus)	2.3.8.34.36.38.42.48.54.55.
borealis (Polyporus)	2.3.9.12.14.34.36.38.44.–46.(48).55.60.
brumalis (Polyporus)	2.3.8.11.32.34.37.38.40.42.43.54.55.60.
cajanderi (Fomes)	1.2.3.8.9.34.36.38.43.44.48.50.(54).55.59.
campanella (Xeromphalina)	2.3.11.16.26.32.37.38.47.55.60.
carbonica (Poria)	1.3.7.24.33.34.36.38.44.–46.50.55.
caryae (Aporpium)	1.2.3.7.8.26.32.36.38.44.–47.48.50.54.55.59.
cinerascens (Poria)	2.4.7.34.36.38.40.41.42.(48).54.55.59.
cinnabarinus (Pycnoporus)	2.3.8.34.35.36.37.38.40.43.–45.48.54.55.60.
circinatus (Polyporus) (See *Polyporus tomentosus)*	
coccineus (Pycnoporus)	2.3.8.34.35.36.37.38.40.43.48.54.55.60.
commune (Schizophyllum)	1.2.3.7.20.32.34.36.38.43.48.54.55.60.
compactus (Polyporus)	2.3.8.34.36.38.42.43.48.50.54.60.
conchatus (Fomes)	2.6.7.8.26.32.37.39.47.54.
conchifer (Polyporus)	2.3.8.32.36.38.40.42.43.54.
confragosa (Daedalea)	2.3.8.10.11.32.37.38.39.43.44.53.54.55.
conissans (Flammula)	2.3.26.32.36.38.43.44.54.55.60.
connatus (Fomes)	2.6.7.8.32.36.38.47.54.
corrugata (Hymenochaete)	2.6.7.11.32.36.37.38.39.42.43.50.54.55.
cuticularis (Polyporus)	2.5.6.10.17.32.37.39.44.–47.(48).54.
dichrous (Polyporus)	1.2.3.7.32.36.38.42.43.(48).53.54.55.
distortus (Polyporus) (See *Polyporus biennis)*	
dryadeus (Polyporus)	2.6.7.32.37.39.47.54.55.
dryophilus (Polyporus)	2.6.8.32.37.39.40.44.45.54.
duplex (Peniophora)	2.3.14.15.16.32.36.37.38.39.42.43.(48).55.60.
ellisianus (Fomes)	2.3.8.32.36.38.44.–46.54.60.
everhartii (Fomes)	2.6.7.8.11.32.37.39.45.46.54.
ferrea (Poria)	2.6.8.32.37.38.40.45.54.55.
ferrugineofusca (Poria)	2.6.18.32.37.38.45.55.
ferruginosa (Poria)	2.6.17.18.32.37.39.45.–47.54.(55).

TABLE I (*Continued*)

Species included in Key

Species	Species Code
fibrillosus (Polyporus)	1.6.14.32.36.38.43.44.48.53.54.55.
fomentarius (Fomes)	2.3.8.10.32.37.38.39.42.–44.54.
fragilis (Polyporus)	1.3.7.32.36.38.47.53.55.
fraxineus (Fomes)	2.3.8.10.34.36.38.43.44.(48).54.60.
fraxinophilus (Fomes)	2.3.8.32.34.36.38.43.44.48.54.60
frondosus (Polyporus)	2.3.8.34.36.38.39.43.–46.(48).53.54.56.
fulvus (Fomes) (See *Fomes pomaceus*)	
fumosus (Polyporus)	1.2.3.7.26.34.36.38.43.44.48.53.54.60.
furfuraceum (Corticium)	2.3.7.33.36.39.47.52.55.
galactinus (Polyporus)	2.4.7.34.36.38.40.42.(48).54.59.
gigantea (Peniophora)	1.2.5.6.7.35.36.38.42.43.53.55.
gilvus (Polyporus)	2.5.6.7.11.17.32.36.37.38.39.43.44.(48).54.55.
glomeratus (Polyporus)	2.6.11.17.18.32.37.39.47.54.(55).
granulosa (Vararia)	2.3.7.33.34.36.38.44.–46.55.59.
graveolens (Polyporus)	2.3.8.10.35.36.37.39.43.44.53.54.
guttulatus (Polyporus)	1.2.3.7.33.36.37.38.44.45.54.55.
heterocystidia (Peniophora)	2.3.7.14.15.33.36.38.40.43.44.48.54.59.
heteromorphus (Coriolellus)	1.3.8.9.32.36.38.45.46.(48).(54).55.59.
hirsutus (Polyporus)	2.3.8.32.34.36.38.42.43.(48).54.55.60.
igniarius (Fomes)	2.6.8.10.17.32.37.39.44.45.50.54.60.
kauffmanii (Lentinus)	1.4.8.32.36.38.44.45.53.55.
lacrymans (Merulius)	1.3.7.8.32.36.37.38.45.46.53.55.60.
laevigatus (Fomes igniarius var.*)*	2.6.8.10.32.37.39.42.43.50.54.
lepideus (Lentinus)	1.4.8.26.34.36.38.43.44.(48).53.55.
lobatum (Ganoderma)	2.3.8.10.32.37.38.43.44.54.
lucidum (Ganoderma) (See *Ganoderma sessile)*	
malicola (Coriolellus)	1.3.8.9.34.36.38.46.47.(48).53.54.57.
mellea (Armillaria)	2.6.10.16.20.32.37.39.47.54.55.
microspora (Poria) (See *Poria placenta)*	
mollis (Polyporus)	1.6.7.32.36.37.38.39.44.53.55.
montanus (Polyporus)	2.6.8.32.34.36.38.45.46.55.56.
monticola (Poria) (See *Poria placenta)*	
murraii (Stereum)	2.3.8.15.32.36.38.47.53.54.58.
mutata (Peniophora)	2.3.7.33.36.40.43.44.54.59.
nidulans (Polyporus)	2.3.7.33.36.37.38.44.48.53.54.55.
nigrolimitatus (Fomes)	2.6.8.17.22.32.37.39.47.55.
obliqua (Poria)	2.6.8.10.17.18.32.37.38.39.45.–47.48.54.
obtusus (Polyporus)	2.3.8.34.36.38.46.48.53.54.60.
odorata (Trametes)	1.3.6.7.34.35.36.38.44.–46.50.55.59.
officinalis (Fomes)	1.3.7.33.34.36.38.47.50.55.
ohiensis (Fomes)	2.3.7.32.36.38.47.(48).53.54.
oregonense (Ganoderma)	2.3.8.10.32.36.37.39.40.43.50.55.
ostreatus (Pleurotus)	2.3.8.32.36.38.40.43.(48).54.55.60.
palustris (Polyporus)	1.3.8.32.34.36.38.43.44.48.54.55.59.
pargamenus (Polyporus)	2.3.8.13.32.36.38.43.44.(48).54.55.60.
piceae (Peniophora)	2.3.5.7.32.36.39.40.43.(48).55.60.
pini (Peniophora)	2.3.14.15.32.36.38.43.48.53.55.60.
pini (Stereum) (See *Peniophora pseudopini)*	
pini (Fomes)	2.6.8.17.26.32.37.39.47.(54).55.
pinicola (Fomes)	1.3.8.32.34.36.38.43.–46.54.55.59.
pithya (Peniophora)	2.3.14.15.22.32.36.37.38.43.(48).52.55.60.
placenta (Poria)	1.3.9.34.36.38.42.–44.(48).54.55.59.
pomaceus (Fomes)	2.6.8.26.32.37.38.39.44.–46.50.54.
populinus (Fomes igniarius var.)	2.6.8.10.32.37.38.39.47.50.54.
populnea (Peniophora)	2.3.7.33.36.38.40.43.54.59.
pseudopini (Peniophora)	2.3.14.15.32.36.37.38.39.42.43.48.53.55.60.
pubescens (Polyporus)	2.3.8.32.36.38.40.42.43.(48).54.60.
punctata (Poria)	2.6.8.11.32.37.38.45.46.54.
puteana (Coniophora)	1.5.7.21.32.35.36.37.38.39.42.53.54.55.57.

TABLE I (*Concluded*)

Species included in Key

Species	Species Code
quercina (Daedalea)	1.3.8.9.34.36.38.44.(48).50.54.
radiatus (Polyporus)	2.6.11.32.37.39.43.44.54.
radicata (Collybia)	2.3.7.11.32.36.37.38.44.45.53.54.55.56.
raduloides (Trechispora)	1.2.3.7.23.33.36.38.45.46.54.55.
resinosus (Polyporus)	2.4.7.26.32.34.36.37.38.40.42.50.54.55.59.
rimosus (Fomes) (See *Fomes robiniae)*	
robiniae (Fomes)	2.6.8.32.37.39.44.–46.(48).54.
roseus (Fomes)	1.2.3.8.32.36.38.39.43.48.54.55.59.
rufa (Poria) (See *Poria taxicola)*	
rutilans (Polyporus) (See *Polyporus nidulans)*	
saepiaria (Lenzites)	1.3.7.8.34.35.37.38.44.–47.(48).53.54.55.59.
sanguineus (Pycnoporus)	2.3.8.34.35.36.37.38.43.44.48.54.55.60.
sanguinolentum (Stereum)	2.5.7.13.21.32.36.38.43.–45.55.57.
schweinitzii (Polyporus)	1.2.6.7.32.34.37.38.39.42.–44.50.54.55.
scutellatus (Fomes)	2.3.8.11.32.36.37.38.43.–46.(48).50.54.
semipileatus (Polyporus)	2.3.9.12.32.36.38.39.47.(48).54.55.
separans (Peniophora) (See *Peniophora piceae)*	
sepium (Coriolellus)	1.3.8.9.32.36.38.44.45.(48).54.55.
septentrionalis (Peniophora)	2.3.14.15.32.36.37.38.40.43.(48).55.60.
sequoiae (Poria)	1.3.7.32.36.38.44.45.48.55.
serialis (Coriolellus)	1.3.8.9.32.34.36.38.45.46.48.(54).55.59.
sericeomollis (Poria)	1.3.9.26.34.36.38.45.–47.52.54.55.
sessile (Ganoderma)	2.3.8.10.34.36.37.38.40.42.(48).54.60.
sinuosus (Coriolellus)	1.3.8.9.32.34.36.38.44.–46.(48).55.58.
squamosus (Polyporus)	2.3.11.35.36.37.38.47.54.58.
suaveolens (Trametes)	2.3.8.34.36.40.42.43.50.54.60.
subacida (Poria)	2.3.8.32.36.38.40.42.43.54.55.
subcartilagineus (Polyporus)	1.3.7.32.34.36.38.45.54.55.
subroseus (Fomes) (See *Fomes cajanderi)*	
sulcatum (Stereum)	2.3.8.13.33.36.38.39.47.55.59.
sulphureus (Polyporus)	1.6.7.33.34.36.38.43.44.54.55.
tabacina (Hymenochaete)	2.6.11.32.37.38.43.54.55.
taxicola (Poria)	1.5.7.32.36.38.42.55.
tenuis (Trametes) (See *Fomes viticola)*	
tigrinus (Lentinus)	2.3.7.34.36.37.38.43.(48).53.54.60.
tinctorium (Echinodontium)	2.3.8.13.34.36.37.39.47.50.53.55.
tomentosus (Polyporus)	2.6.11.17.26.34.37.39.47.55.
trabea (Lenzites)	1.3.7.8.34.35.37.38.43.44.(48).53.54.55.59.
tsugae (Ganoderma)	2.3.8.10.32.36.37.38.40.43.44.55.
tsugina (Poria)	2.6.8.11.32.37.39.47.55.
tuberaster (Polyporus)	2.3.8.11.32.37.39.44.–46.54.56.60.
tulipiferae (Polyporus)	1.2.6.7.8.14.32.36.40.42.43.(48).53.54.
ulmarius (Pleurotus)	Omitted; description based on incorrectly identified cultures
umbellatus (Polyporus)	2.3.7.35.36.38.39.49.54.56.
unicolor (Cerrena)	2.3.8.32.36.38.40.42.43.53.54.55.59.
vaillantii (Poria)	1.3.8.32.36.38.43.44.48.55.
variiformis (Coriolellus)	1.3.8.9.32.36.38.46.47.(48).53.(54).55.59.
vellereum (Corticium)	1.3.7.34.36.38.43.44.48.54.60.
velutipes (Collybia)	1.2.3.7.26.35.36.37.38.43.52.54.60.
versicolor (Polyporus)	2.3.8.11.32.34.36.37.40.42.(48).53.54.55.60.
viticola (Fomes)	2.6.7.8.17.32.37.38.47.53.54.55.
volvatus (Polyporus)	2.3.8.26.32.36.38.43.–46.53.55.60.
vulpinus (Polyporus)	2.6.8.11.26.32.37.38.39.44.45.48.54.
weirii (Poria)	2.6.18.32.37.38.40.43.44.53.55.
xantha (Poria)	1.3.7.9.25.32.34.36.38.43.44.48.54.55.
zonatus (Polyporus)	2.3.8.32.34.35.36.40.42.43.54.60.

The Species Code for each species is entered on a card, the appropriate holes are punched, and the cards are sorted with the aid of a sorting needle. The set of punched Species Code cards can be used directly as a key by sorting to extract the card or cards with a Species Code identical with that of the culture to be identified. However, this direct matching of cards is cumbersome and has been replaced by a written multiple-choice key, prepared from the punched cards, in which the Code Symbols are used to build up Key Codes.

Diagnostic Characters and their Code Symbols

Production of Extracellular Oxidase

CODE SYMBOL 1. Results negative in tests for extracellular oxidase

CODE SYMBOL 2. Results positive in tests for extracellular oxidase

In tests, 32 species have given consistently negative results, indicating lack of extracellular oxidase, denoted by Code Symbol 1, while 103 species have given consistently positive results, indicating the production of extracellular oxidase, denoted by Code Symbol 2. This difference is the basis for the first division in the key, separating the species into the two major groups under the Key Codes 1 and 2. The 14 species whose cultures give erratic results in tests for extracellular oxidase (Nobles 1958*a*; Davidson, Campbell, and Blaisdell 1938), and whose Species Codes, therefore, include both Code Symbols 1 and 2, are treated in both sections of the key. As stated by Bavendamm (1928) and corroborated by Davidson, Campbell, and Blaisdell (1938), species whose cultures lack extracellular oxidase are usually associated with brown rots while those species whose cultures produce extracellular oxidase are associated with white rots. In certain species whose cultures give erratic results in tests for extracellular oxidase, information about the type of rot that they produce in the host may aid in identification and has been included in the description.

In an earlier paper (Nobles 1958*b*), I claimed that in the Polyporaceae at least, this separation has taxonomic significance, those species that do not produce extracellular oxidase constituting a primitive group while those that do produce extracellular oxidase are more advanced.

Septation of Hyphae

CODE SYMBOL 3. Thin-walled hyphae consistently nodose-septate (Figs. 1, 2)

CODE SYMBOL 4. Thin-walled hyphae simple-septate in the advancing zone, these hyphae, usually broad, giving off branches which are narrower and nodose-septate, the older part of the mat being composed of such nodose-septate hyphae (Figs. 4, 5)

CODE SYMBOL 5. Thin-walled hyphae mainly simple-septate but with occasional single or multiple clamp connections, these occurring most frequently on the hyphae of the advancing zone (Figs. 6, 7)

CODE SYMBOL 6. Thin-walled hyphae consistently simple-septate (Fig. 3)

The examination of the hyphae of the advancing zone is essential in diagnosis since it is in this region that the simple septa of hyphae in species with Code Symbol 4 and the rare single or multiple clamp connections on hyphae of species with Code Symbol 5 can be observed. Of the species included in the key, 100 have thin-walled hyphae consistently nodose-septate, although in one of these species, *Trametes odorata*, the hyphae of aged cultures may become simple-septate. *Peniophora piceae* and *Stereum abietinum* have simple septa and clamp connections occurring in the same hyphae and they, like *Trametes odorata*, have been assigned Code Symbols that indicate the occurrence of both types of septation. Six species, *Polyporus galactinus*, *P. resinosus*, *Poria albipellucida*, *P. cinerascens*, *Lentinus kauffmanii*, and *L. lepideus* have the type of septation denoted by Code Symbol 4. Three species, *Coniophora puteana*, *Stereum sanguinolentum*, and *Poria taxicola*, have mainly simple-septate hyphae with single or multiple clamp connections occurring occasionally, denoted by Code Symbol 5, while *Fomes annosus*, *Polyporus cuticularis*, *P. gilvus*, and *Peniophora gigantea*, which may have rare clamp connections, have Code Symbols 5 and 6 in their Species Codes. The remaining 34 species have hyphae which are consistently simple-septate, shown by Code Symbol 6. The preponderance in the Polyporaceae of species with regular or occasional clamp connections on their thin-walled hyphae was interpreted (Nobles 1958*b*) as an indication that the nodose-septate condition is the primitive condition.

Occurrence of Special Structures Formed by Differentiation of Hyphae

CODE SYMBOL 7. Hyphae remaining thin-walled and undifferentiated

CODE SYMBOLS 8 to 26. Hyphae differentiated to form special structures

Code Symbol 7 stands in opposition to Code Symbols 8 to 26, separating those species in which the hyphae remain undifferentiated from those in which they are differentiated to form special structures. Code Symbol 7 and Code Symbols 8 to 26 should, therefore, be mutually exclusive. However, in certain species a structure may be "rare or apparently lacking", a condition

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FIGS. 1–41. All ×455.

FIGS. 1–7. Septation of hyphae. Figs. 1, 2. Nodose-septate hyphae. Fig. 1. *Polyporus betulinus*. Fig. 2. *Polyporus anceps*. Fig. 3. Simple-septate hyphae, *Polyporus tulipiferae*. Figs. 4, 5. Hyphae simple-septate in the advancing zone, giving off nodose-septate branches. Fig. 4. *Polyporus galactinus*. Fig. 5. *Polyporus resinosus*. Fig. 6. Multiple clamp connections, *Stereum sanguinolentum*. Fig. 7. Single clamp connection in mainly simple-septate hypha, *Peniophora gigantea*.

FIGS. 8–12. Fiber hyphae. Fig. 8. *Polyporus amorphus*. Fig. 9. *Coriolellus serialis*. Fig. 10. *Pycnoporus cinnabarinus*. Fig. 11. *Polyporus tuberaster*. Fig. 12. *Polyporus anceps*.

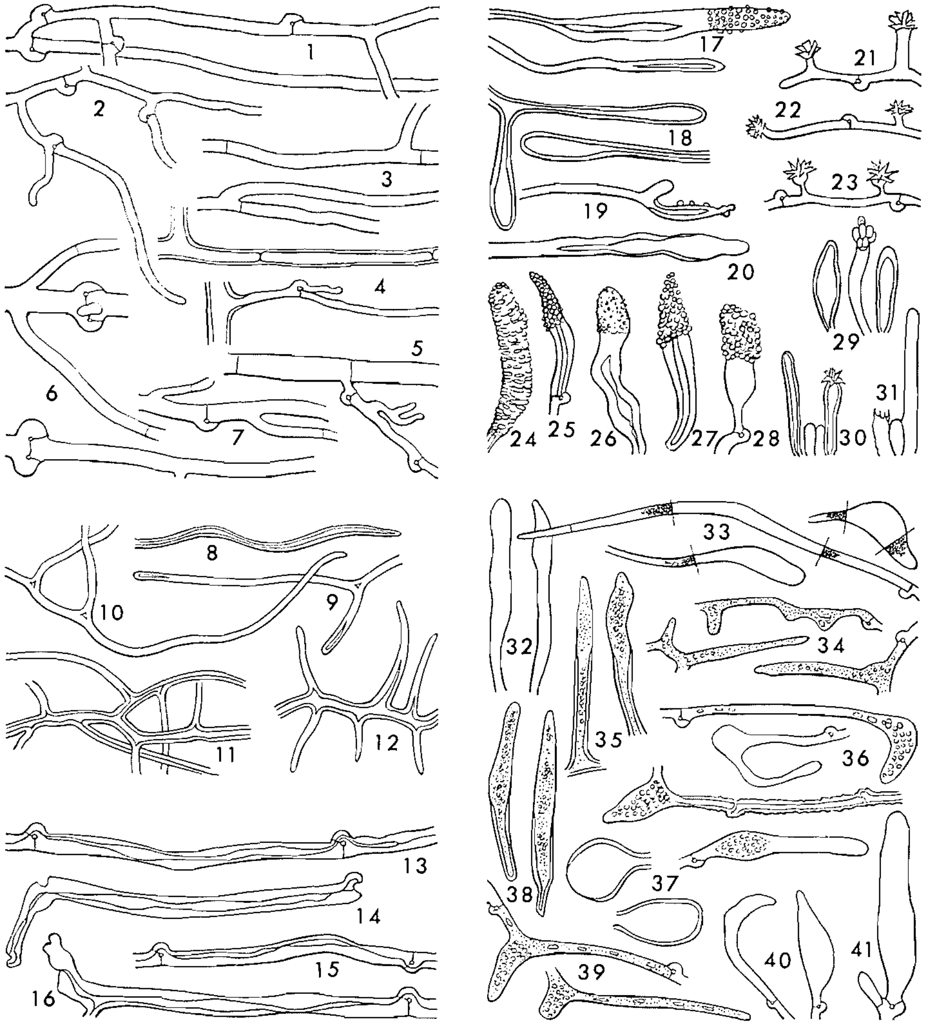
FIGS. 13–16. Nodose-septate hyphae with walls irregularly thickened. Fig. 13. *Coriolellus sepium*. Fig. 14. *Poria placenta*. Fig. 15. *Daedalea quercina*. Fig. 16. *Fomes cajanderi*.

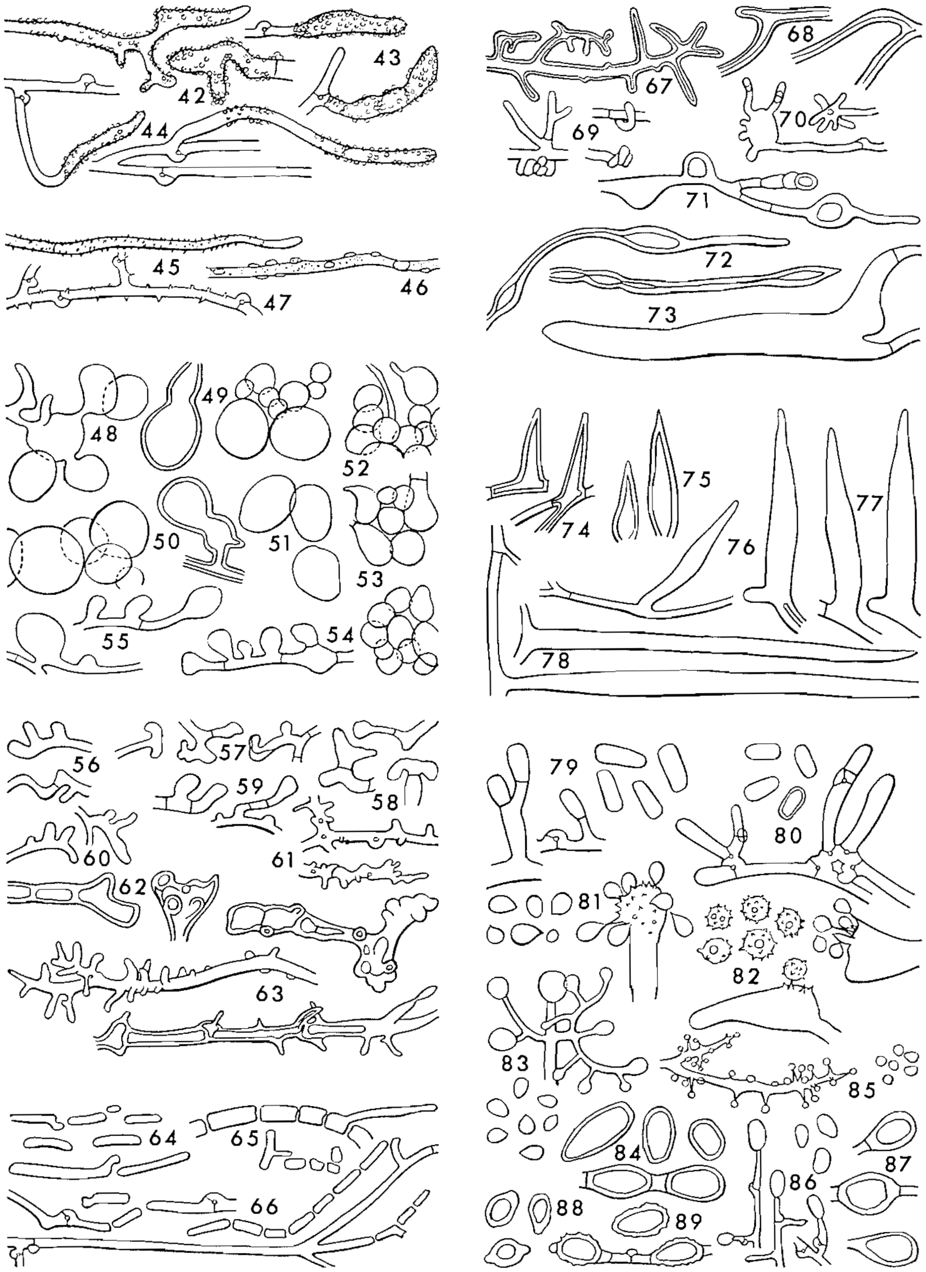
FIGS. 17–31. Cystidia. Figs. 17–23. Cystidia from vegetative mycelium. Fig. 17. *Echinodontium tinctorium*. Fig. 18. *Stereum sanguinolentum*. Fig. 19. *Stereum sulcatum*. Fig. 20. *Stereum abietinum*. Fig. 21. *Polyporus pargamenus*. Fig. 22. *Polyporus abietinus*. Fig. 23. *Odontia bicolor*. Figs. 24–31. Cystidia from fruit bodies in culture. Fig. 24. *Peniophora duplex*. Fig. 25. *Peniophora pithya*. Fig. 26. *Peniophora pseudopini*. Fig. 27. *Peniophora septentrionalis*. Fig. 28. *Peniophora heterocystidia*. Fig. 29. *Polyporus borealis*. Fig. 30. *Polyporus pargamenus*. Fig. 31. *Polyporus fibrillosus*.

FIGS. 32–41. Gloeocystidia. Fig. 32. *Peniophora duplex*, from fruit body. Fig. 33. *Peniophora pini*, from vegetative mycelium. Fig. 34. *Peniophora pithya*, from mycelium. Fig. 35. *Peniophora pithya*, from fruit body in culture. Fig. 36. *Peniophora pseudopini*, from mycelium. Fig. 37. *Peniophora pseudopini*, from fruit body in culture. Fig. 38. *Peniophora septentrionalis*, from fruit body in culture. Fig. 39. *Peniophora septentrionalis*, from mycelium. Fig. 40. *Stereum murraii*, from mycelium. Fig. 41. *Peniophora heterocystidia*, from fruit body in culture.

expressed in the Species Code by the inclusion of Code Symbol 7, denoting no special structure, and also the Code Symbol that denotes the occurrence of that structure. Species with such Species Codes are traced out in both sections of the key.

CODE SYMBOL 8. Hyphae differentiated to form fiber hyphae (Figs. 8–12) I have previously defined fiber hyphae as "Hyphae with thick refractive walls, hyaline or brown, and lumina narrow or apparently lacking, observed in many species" (Nobles 1948). These arise usually as the elongated terminal cell of a hypha and are thus aseptate. Van der Westhuizen (1963) has demonstrated the presence of clamp connections on fiber hyphae in *Cerrena unicolor* and I have since observed rare clamp connections on the fiber hyphae of





Lenzites betulina. Branching may be absent, as in *Polyporus amorphus* (Fig. 8), rare, as in *Coriolellus serialis* (Fig. 9) and *Pycnoporus cinnabarinus* (Fig. 10), or frequent, as in *Polyporus tuberaster* (Fig. 11) and *P. anceps* (Fig. 12). In many species the fiber hyphae are numerous, long and flexuous, and interwoven to form a thick mat, often coherent and tough.

CODE SYMBOL 9. Hyphae differentiated to form nodose-septate hyphae with irregularly thickened walls or with scattered thick-walled, refractive areas on walls (Figs. 13–16, 90, 92)

In hyphae of this type, the walls become irregularly thickened, refractive, and in some species at least, apparently gelatinously modified, while the lumen is reduced to a narrow line with occasional expansions, often running from side to side in the hypha. In some species, the first indication of this type of differentiation is the formation of hyphae with numerous short branches or protuberances whose walls are thick or solid and refractive. The clamp connections may become enlarged, thick-walled, and in appearance suggest a ball-and-socket bone structure. Such hyphae occur unaccompanied by fiber hyphae in species such as *Polyporus semipileatus* (Fig. 90) and *Poria placenta* (Fig. 14), and in association with numerous fiber hyphae in *Coriolellus* species (Figs. 13, 92), *Daedalea quercina* (Fig. 15), and *Fomes cajanderi* (Fig. 16).

CODE SYMBOL 10. Hyphae differentiated to form cuticular cells, closely packed together to form a pseudoparenchyma (Figs. 48–55, 93)

Hyphae of this type arise as terminal or intercalary swellings on hyphae, at first hyaline with contents staining in phloxine, finally with walls slightly

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FIGS. 42–89. All ×455.

FIGS. 42–44. Contorted incrusted hyphal tips. Fig. 42. *Polyporus borealis*. Fig. 43. *Polyporus semipileatus*. Fig. 44. *Polyporus albellus*.

FIGS. 45–47. Projections on walls of hyphae. Fig. 45. *Armillaria mellea*. Fig. 46. *Stereum sanguinolentum*. Fig. 47. *Schizophyllum commune*.

FIGS. 48–55. Cuticular cells from pseudoparenchymatous areas. Fig. 48. *Ganoderma sessile*. Fig. 49. *Ganoderma tsugae*. Fig. 50. *Ganoderma applanatum*. Fig. 51. *Polyporus graveolens*. Fig. 52. *Fomes igniarius*. Fig. 53. *Fomes igniarius* var. *laevigatus*. Fig. 54. *Fomes igniarius* var. *populinus*. Fig. 55. *Armillaria mellea*.

FIGS. 56–63. Interlocking hyphae from pseudoparenchymatous areas. Fig. 56. *Hymenochaete tabacina*. Fig. 57. *Polyporus vulpinus*. Fig. 58. *Poria tsugina*. Fig. 59. *Polyporus radiatus*. Fig. 60. *Xeromphalina campanella*. Fig. 61. *Polyporus arcularius*. Fig. 62. *Polyporus squamosus*. Fig. 63. *Polyporus tuberaster*.

FIGS. 64–66. Oidia. Fig. 64. *Lenzites saepiaria*. Fig. 65. *Peniophora gigantea*. Fig. 66. *Polyporus adustus*.

FIGS. 67–73. Special structures. Fig. 67. Hypha with right-angled branches, from *Poria carbonica*. Fig. 68. Non-staining hyphae with thickened walls, from *Poria xantha*. Fig. 69. Bulbils from *Fomes nigrolimitatus*. Fig. 70. Bulbils from *Peniophora pithya*. Fig. 71. Hyphal swellings or chlamydospores from *Polyporus tomentosus*. Fig. 72. Expansions on hyphae, from *Fomes pini*. Fig. 73. Lactiferous cell, from *Polyporus resinosus*.

FIGS. 74–78. Setae and setal hyphae. Figs. 74–77. Setae. Fig. 74. *Polyporus gilvus*. Fig. 75. *Poria obliqua*. Fig. 76. *Fomes pini*. Fig. 77. *Polyporus tomentosus*. Fig. 78. Setal hyphae, *Poria ferruginosa*.

FIGS. 79–89. Conidia and chlamydospores. Fig. 79. Conidia from *Pholiota aurivella*. Fig. 80. Conidia from *Polyporus guttulatus*. Fig. 81. Conidiophore and conidia from *Fomes annosus*. Fig. 82. Conidiophores and conidia from *Polyporus berkeleyi*. Fig. 83. Conidiophore and conidia from *Polyporus sulphureus*. Fig. 84. Chlamydospores from *Polyporus sulphureus*. Fig. 85. Conidiophore and conidia from *Polyporus nidulans*. Fig. 86. Conidiophores and conidia from *Poria carbonica*. Fig. 87. Chlamydospores from *Poria carbonica*. Fig. 88. Chlamydospores from *Polyporus balsameus*. Fig. 89. Chlamydospores from *Poria sericeomollis*.

thickened and remaining hyaline or becoming brown, closely packed to form pseudoparenchymatous areas which appear skinlike or crustose on the surface of the mycelial mats. Cuticular cells accompanied by fiber hyphae are characteristic of species of *Ganoderma* (Figs. 48–50) and occur also in *Daedalea confragosa* (Fig. 93), *Fomes fraxineus*, *F. fomentarius*, and *Polyporus graveolens* (Fig. 51). In species with brown simple-septate hyphae and brown mats, cuticular cells accompanied by fiber hyphae occur in *Fomes igniarius* (Fig. 52) and its varieties *laevigatus* (Fig. 53) and *populinus* (Fig. 54) and in some isolates of *Poria obliqua*. Cuticular cells without accompanying fiber hyphae are present in cultures of *Armillaria mellea* (Fig. 55) and *Polyporus cuticularis* and in some isolates of *Fomes annosus* where they are mixed with interlocking hyphae (Code Symbol 11) to form a very coherent mat.

CODE SYMBOL 11. Hyphae differentiated through formation of numerous short branches, hooked or recurved, or thick-walled nodules, interlocked to form a plectenchyma (Figs. 56–63)

Preparations for microscopic study from the tough, skinlike areas on the mycelial mats of a number of species show a plectenchyma which resembles a jigsaw puzzle or mosaic. The firmly interlocked component hyphae, denoted by Code Symbol 11, include two types, those with numerous short branches, hooked or recurved (Figs. 56–60) and those with irregular, thick-walled branches, nodules, or protuberances (Figs. 61–63). In species with brown simple-septate hyphae and brown mats, such as *Hymenochaete tabacina* (Fig. 56), *Polyporus vulpinus* (Fig. 57), *Poria tsugina* (Fig. 58), and *Polyporus radiatus* (Fig. 59), and in *Xeromphalina campanella* (Fig. 60), a species with nodose-septate hyphae, the hyphae composing the "jigsaw" areas are of the first type, with numerous hooked or recurved branches. In cultures of species of *Polyporus sensu stricto*, including *P. arcularius* (Fig. 61), *P. brumalis*, *P. squamosus* (Fig. 62), and *P. tuberaster* (Fig. 63) of the present paper, the interlocking hyphae are of the second type, nodose-septate with numerous nodules or protuberances which become thick-walled and colored and, together with fiber hyphae, form the dark skinlike areas that are characteristic of these species.

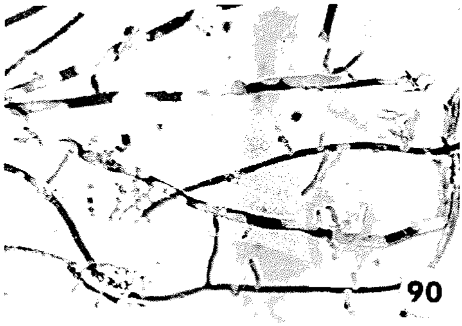
CODE SYMBOL 12. Hyphae differentiated to form numerous contorted, incrusted hyphal tips (Figs. 42–44, 91)

Numerous contorted hyphal tips, heavily incrusted, are conspicuous in preparations for microscopic study from the aerial mycelium of *Polyporus borealis* (Fig. 42), *P. semipileatus* (Figs. 43, 91), and *P. albellus* (Fig. 44). These appear to be specialized structures, differing from the lightly incrusted hyphae or hyphal segments that occur in many species. They are accompanied in the three species listed above by hyphae with irregularly thickened walls (Code Symbol 9) as illustrated for *P. semipileatus* (Fig. 90).

FIGS. 90–98. All ×400.

FIG. 90. Nodose-septate hyphae with walls irregularly thickened, from *Polyporus semipileatus*. FIG. 91. Contorted incrusted hyphal tips, from *Polyporus semipileatus*. FIG. 92. Hyphae with walls irregularly thickened, from *Coriolellus heteromorphus*. FIG. 93. Cuticular cells, from *Daedalea confragosa*. FIG. 94. Allocysts from *Flammula conissans*. FIG. 95. Setal hypha from *Poria obliqua*. FIG. 96. Conidia from *Polyporus sulphureus*. FIG. 97. Chlamydospores from *Poria carbonica*. FIG. 98. Setal hyphae from *Poria ferrugineofusca*.

PLATE I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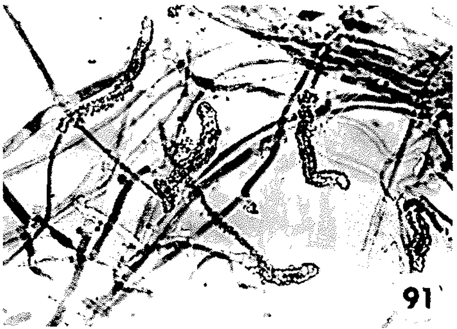
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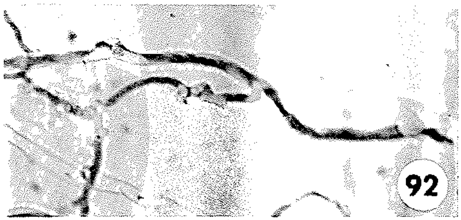
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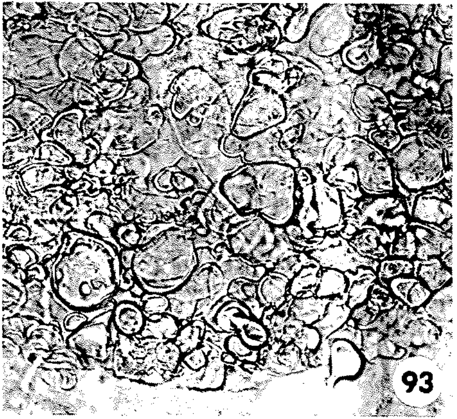
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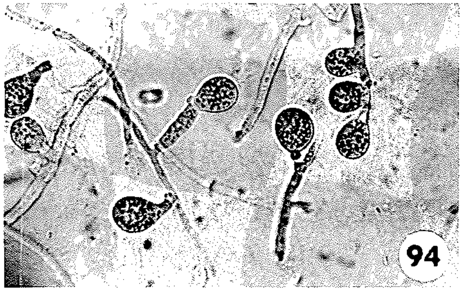
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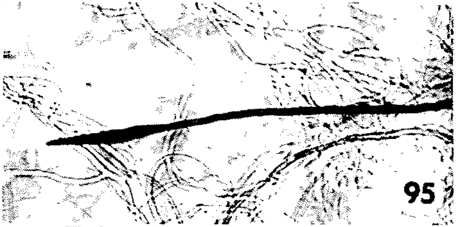
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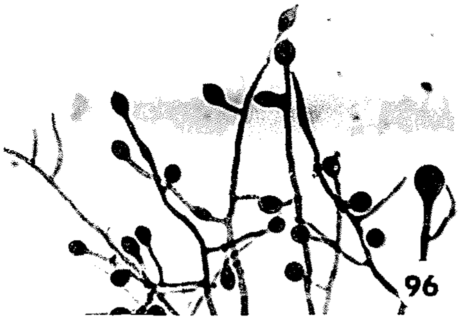
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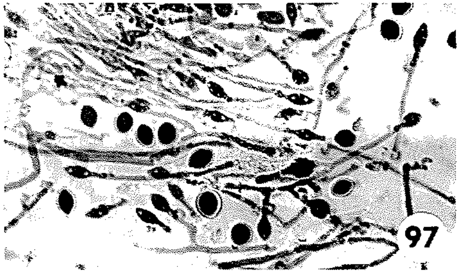
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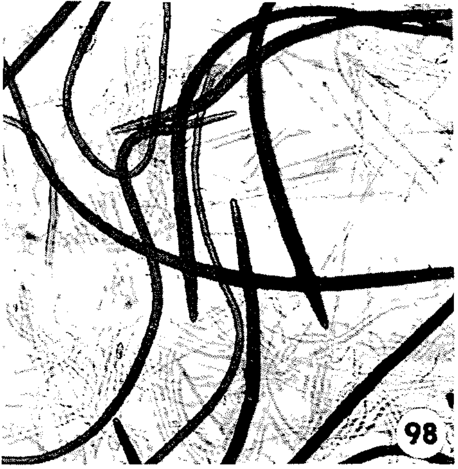
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CODE SYMBOL 13. Cystidia present on vegetative mycelium (Figs. 17–23)

The term cystidium is applied usually to sterile organs that occur in the hymenium of certain species, but in six species included in the present key, structures similar to the cystidia of the hymenium are found on the aerial mycelium. These include the cylindric, incrusted cystidia of *Echinodontium tinctorium* (Fig. 17), the cystidium-like hyphal ends in *Stereum sanguinolentum* (Fig. 18), the pointed cystidia of *S. sulcatum* (Fig. 19), the cystidia with lumen expanded at the tip of *S. abietinum* (Fig. 20), and the incrusted, capitate cystidia of *Polyporus pargamenus* (Fig. 21), *P. abietinus* (Fig. 22), and *Odontia bicolor* (Fig. 23). Their presence provides a valuable clue for the identification of cultures of these species.

CODE SYMBOL 14. Cystidia present, restricted to the hymenium of fruiting areas (Figs. 24–31)

Of the species of *Peniophora sensu stricto* included in the present key, *P. duplex* (Fig. 24), *P. pini, P. pithya* (Fig. 25), *P. pseudopini* (Fig. 26), and *P. septentrionalis* (Fig. 27) fruit regularly or occasionally in culture, with the formation of typical incrusted cystidia. Hymenial cystidia have been observed also in fruiting cultures of *Peniophora heterocystidia* (Fig. 28), *Polyporus borealis* (Fig. 29), *P. fibrillosus* (Fig. 31), *P. pargamenus* (Fig. 30), and *P. tulipiferae*.

CODE SYMBOL 15. Gloeocystidia present on vegetative mycelium or in hymenium of fruiting areas (Figs. 32–41)

Gloeocystidia, which may react positively with sulfuric benzaldehyde (Boidin 1951) to become blackish in mounts, occur in the vegetative mycelium and fruiting areas of species of *Peniophora sensu stricto,* as illustrated for *Peniophora duplex* (Fig. 32), *P. pini* (Fig. 33), *P. pithya* (Figs. 34, 35), *P. pseudopini* (Figs. 36, 37), and *P. septentrionalis* (Figs. 38, 39). Gloeocystidia were observed also in the fruit body of *P. heterocystidia* (Fig. 41) in culture and on the aerial mycelium of *Stereum murraii* (Fig. 40).

CODE SYMBOL 16. Hyphae aggregated to form conspicuous strands or rhizomorphs

Of the species included in the present key, only *Armillaria mellea* with conspicuous branching rhizomorphs and *Xeromphalina campanella* with strands described as "aerial rhizomorphs" have this Code Symbol. Strands formed by the aggregation of hyphae with gelatinously modified walls in *Peniophora duplex* and perhaps other species of *Peniophora sensu stricto* have been noted in descriptions but have not been given diagnostic status.

CODE SYMBOL 17. Setae on aerial mycelium or in fruiting areas (Figs. 74–77)

CODE SYMBOL 18. Setal hyphae on aerial mycelium (Figs. 78, 95, 98)

Setae and setal hyphae are conspicuous and readily recognized structures but their value in identifications is limited because of their erratic occurrence. In some species, such as *Poria ferrugineofusca* (Fig. 98) and *Poria weirii*, setal hyphae are consistently present and numerous and thus can be considered a reliable diagnostic character but in other species they occur rarely or may be apparently lacking. Mounts from several areas of a culture of *Fomes pini* may lack setae completely while a mount from another area may show them in abundance (Fig. 76). Structures that can be so easily overlooked in the examination of mycelium are of little diagnostic value.

CODE SYMBOL 19. Not in use in present key

CODE SYMBOL 20. Hyphae with minute projections on walls, as in *Armillaria mellea* (Fig. 45) and *Schizophyllum commune* (Fig. 47)

CODE SYMBOL 21. Hyphae with resinous masses clinging to walls, as in *Stereum sanguinolentum* (Fig. 46)

CODE SYMBOL 22. Bulbils or knots of hyphae, as in *Fomes nigrolimitatus* (Fig. 69) and *Peniophora pithya* (Fig. 70)

CODE SYMBOL 23. Sclerotia, as in *Trechispora raduloides*

CODE SYMBOL 24. Hyphae with walls slightly thickened and lumen empty or at least non-staining and with rigid, more or less right-angled branches, as in *Poria carbonica* (Fig. 67)

CODE SYMBOL 25. Hyphae with walls somewhat thickened and lumen non-staining, as in *Poria xantha* (Fig. 68)

The characteristic hyphae of *Poria xantha* are difficult to describe and illustrate. It is possible that they may be interpreted as nodose-septate hyphae with irregularly thickened walls (Code Symbol 9) or may be overlooked (Code Symbol 7) so that the Species Code includes 7, 9, and 25 and the species occurs in three sections of the key.

CODE SYMBOL 26. Noteworthy swellings on hyphae

"Swellings" is an omnibus term, covering everything from inconspicuous swellings on thin-walled hyphae to the conspicuous swellings in moniliform arrangement in *Polyporus volvatus*, lactiferous cells of *Collybia velutipes* and *Polyporus resinosus* (Fig. 73), allocysts of *Flammula alnicola* and *F. conissans* (Fig. 94), expansions on brown fiber hyphae, as in *Fomes pini* (Fig. 72), and swellings on hyphae of *Polyporus tomentosus* (Fig. 71) which may be interpreted as simple swellings or as chlamydospores.

CODE SYMBOLS 27 to 31. Not in use in present key

Occurrence of Conidia, Chlamydospores, and Oidia

CODE SYMBOL 32. Conidia, chlamydospores, and oidia lacking

CODE SYMBOL 33. Conidia present (Figs. 79–83, 85, 86, 96)

CODE SYMBOL 34. Chlamydospores present (Figs. 84, 87–89, 97)

CODE SYMBOL 35. Oidia present (Figs. 64–66)

Code Symbol 32 stands in opposition to Code Symbols 33, 34, and 35, separating those species in which no accessory spores occur from those in which conidia, chlamydospores, or oidia are present and so Code Symbols 32 and 33, 34, 35 should be mutually exclusive. However, in some species chlamydospores occur rarely or may be apparently lacking in some isolates, and such species have Code Symbols 32 and 34 in their Species Codes. Similarly, in certain species oidium production is variable and such species have Code Symbols 32 and 35 in their Species Codes.

As used here, conidia are those secondary spores which are borne terminally on specialized structures, the conidiophores. The types of conidiophores of species in the key include the oedocephaloid conidiophores of *Fomes annosus* (Fig. 81), *Peniophora heterocystidia*, *P. mutata*, *P. populnea*, *Corticium furfuraceum*, and *Vararia granulosa*, the spraylike conidiophores of *Polyporus sulphureus* (Fig. 83), the sympodium-type conidiophores in *Trechispora raduloides*, the bottle-brush conidiophores of *Polyporus nidulans* (Fig. 85), and so on. Most of the 15 conidium-bearing species in the key are readily recognized.

Chlamydospores, present in many species, may be numerous as in *Poria carbonica* (Fig. 97), *Polyporus compactus*, *P. biennis*, *Corticum vellereum*, and others, to rare or apparently lacking in other species. They may be terminal or intercalary, have thin to thick walls, the thick-walled chlamydospores of *Poria sericeomollis* (Fig. 89) and *Fomes fraxineus* appearing rough-walled or sculptured, remaining hyaline or, in *Polyporus schweinitzii* and *P. balsameus* (Fig. 88), becoming brown, imparting their color to the mat.

Oidia are formed by the fragmentation of nodose-septate hyphae, as in *Lenzites saepiaria* (Fig. 64), where the clamp connection may remain attached to the oidium, or by the fragmentation of simple-septate branches from nodose-septate hyphae, as in *Polyporus adustus* (Fig. 66). In some species, such as *Peniophora gigantea* (Fig. 65), the mycelium is almost completely converted into oidia while in other species oidia may be rare or apparently lacking.

Color of Hyphae and Mycelial Mats

CODE SYMBOL 36. Hyphae hyaline and mats white or pale in color

CODE SYMBOL 37. Hyphae yellow or brown when mounted in KOH solution and mats yellow or brown, at least in part

Color Changes in Agar Induced by Growth of Fungus ("Reverse")

CODE SYMBOL 38. Reverse unchanged in color

CODE SYMBOL 39. Reverse brown, at least in part

CODE SYMBOL 40. Reverse bleached, at least in part

Rate of Growth

CODE SYMBOL 41. Plates covered in 1 week

CODE SYMBOL 42. Plates covered in 2 weeks

CODE SYMBOL 43. Plates covered in 3 weeks

CODE SYMBOL 44. Plates covered in 4 weeks

CODE SYMBOL 45. Plates covered in 5 weeks

CODE SYMBOL 46. Plates covered in 6 weeks

CODE SYMBOL 47. Plates not covered in 6 weeks

The rates of growth are expressed as the number of weeks required by the culture to cover the agar in a 9-cm Petri dish from an inoculum at the side, when grown in the dark in fluctuating room temperatures. As indicated by the Species Codes, most species show a range, such as 42.43. or 44.–47., and so growth rates can be used only rarely as a basis for the separation of species.

Production of Fruit Bodies in Culture

CODE SYMBOL 48. Fruit bodies regularly produced before the end of 6 weeks. The enclosing of the Symbol in parentheses (48) indicates that fruit body formation occurs in some isolates and not in others.

CODE SYMBOL 49. Not in use in present key

Odor of Cultures

CODE SYMBOL 50. Odor fragrant, including the sweet or fruity odors of some species and the wintergreen odor of *Fomes igniarius* and its varieties

Code Symbol 51. Odor earthy or musty, as in *Pholiota aurivella* and *Flammula alnicola*
Code Symbol 52. Odor suggesting an antiseptic, such as the iodoform odor of *Polyporus balsameus*
Code Symbol 53. Odor noteworthy but not as described above

Host Relationships
Code Symbol 54. Associated with decay in broad-leaved trees
Code Symbol 55. Associated with decay in coniferous trees
Code Symbol 56. Occurring in other habitats, for example on soil, etc.

Interfertility Phenomena
Code Symbol 57. Species homothallic, completing its life history from single basidiospore
Code Symbol 58. Heterothallic, but type of interfertility not known
Code Symbol 59. Heterothallic, showing the bipolar type of interfertility
Code Symbol 60. Heterothallic, showing the tetrapolar type of interfertility

Species Codes

The list of Code Symbols that denote the cultural characters of a given species constitutes the Species Code, which provides a fairly complete description of the cultural characters of the species. Thus, for *Trametes suaveolens*, the Species Code 2.3.8.34.36.40.42.43.50.54.60. describes the species as producing extracellular oxidase in culture, having its thin-walled hyphae consistently nodose-septate, having fiber hyphae, chlamydospores, a white mycelial mat, the agar bleached, the surface of the agar in Petri dishes covered in 2 or 3 weeks, a fragrant odor, as occurring on broad-leaved trees, and having the tetrapolar type of interfertility. Such a species, with no variable characters, would occur in only one place in the key. Cultures of *Lenzites saepiaria*, whose Species Code is 1.3.(7).(8).(34).35.37.38.44.–47.(48).53.(54).55.59. produce no extracellular oxidase, have consistently nodose-septate hyphae, may or may not have fiber hyphae, may or may not have chlamydospores, have oidia, colored mycelial mats, unchanged agar, cover the agar in Petri dishes in 4 to 6 or more weeks, may fruit, have a spicy odor, may occur on broad-leaved trees but usually are associated with decays in coniferous trees, and show the bipolar type of interfertility. The presence of parentheses around any Code Symbol indicates that the character it represents may or may not be present.

The species included in the present key are listed in Table I, with their Species Codes. The table thus constitutes an index since the Key Codes under which the species appear in the key can be read from the Species Code.

In the key, Key Codes, consisting of the appropriate Code Symbols, have been used to designate the sections. The first division sets up the two basic sections, Key Code 1 for the species whose cultures do not produce extracellular oxidase, Key Code 2 for the species whose cultures do. The species that fall into each section are then divided into four groups on the basis of the type of septation of their hyphae. With succeeding divisions, based on presence or absence of special structures (Code Symbols 7 to 26) and of accessory spores (Code Symbols 32 to 35), the Key Codes are built up, the Code

Symbols in each Key Code indicating the cultural characters that are common to the species in the section. Thus Key Code 1.3.8.9.32. designates the section that includes species whose cultures give a negative test for extracellular oxidase, have nodose-septate hyphae, fiber hyphae, nodose-septate hyphae with walls irregularly thickened, and no accessory spores. Divisions based on the characters denoted by these Code Symbols (1 to 35) occasionally lead to individual species but usually segregate groups of species, some of which coincide with generic groupings made on the basis of the morphological similarities of their fruit bodies. Examples are *Coriolellus* species under Key Code 1.3.8.9., *Ganoderma* species under Key Code 2.3.8.10., *Polyporus sensu stricto* species under Key Code 2.3.8.11., and *Peniophora sensu stricto* under Key Code 2.3.14.15.

Within the sections so segregated, specific identification of cultures is based on characters denoted by Code Symbols 36 to 60 and on additional characters that have not been expressed symbolically, such as color, topography, and texture of mycelial mats, results of different tests for extracellular oxidase, relative numbers of chlamydospores, and so on, or on the whole complex of characters shown by the individual species. Descriptions for the species in each section, detailing the characters useful in their separation, are given.

Terms Used in Describing Texture of Mat

In the inserted descriptions of cultural characters of species, the terms listed below are used to describe the texture of the mycelial mats. A number of these terms, followed by (L. and H.) in the list, were introduced by Long and Harsch (1918) and their original definitions or modifications of them are given. Definitions of the remaining terms were adapted from an earlier paper (Nobles 1948).

Chamoislike.—Smooth, with the texture of fine chamois.

Cottony (L. and H.).—"Erect, rather long (3 to 5 mm.) mycelium spreading in all directions".

Crustose.—Forming a crust, usually dark in color.

Downy (L. and H.).—Short fine hyphae, frequently erect, loosely scattered over surface of agar to produce a downy mat, usually thin enough to be translucent.

Farinaceous.—Having a mealy surface, powdery.

Felty (L. and H.).—Mat composed of cottony or woolly mycelium, which has become interwoven and matted, to form a surface like felt.

Floccose.—Consisting of small tufts on agar or of cottony or woolly mycelium aggregated to form small erect tufts.

Lacunose.—Covered with pits or depressions.

Plumose (L. and H.).—Having tufts of mycelium with a central axis, from which short or long hyphae or groups of hyphae radiate, often in fanlike arrangement.

Plushlike.—Similar to velvety but with a thicker "pile".

Silky (L. and H.).—With long parallel hyphae or groups of hyphae, more or less prostrate, like combed silk.

Subfelty (L. and H.).—With mycelium appressed to agar, forming a thin, often barely visible, mat.

Velvety (L. and H.).—With a layer of mycelium consisting of distinct, straight, erect hyphae, densely arranged to form a "pile" like velvet.

Woolly (L. and H.).—With mycelium composed of fairly long hyphae or groups of hyphae, somewhat matted, to form a surface resembling a soft textured woollen cloth.

Key for the Identification of Cultures of Wood-inhabiting Hymenomycetes

Results of tests for extracellular oxidase negative.............................Key Code 1.
Results of tests for extracellular oxidase positive.............................Key Code 2.

Key Code 1.
Thin-walled hyphae consistently nodose-septate...........................Key Code 1.3.
Thin-walled hyphae simple-septate in the advancing zone, nodose-septate elsewhere...Key Code 1.4.
Thin-walled hyphae mainly simple-septate but with occasional single or multiple clamp connections...Key Code 1.5.
Thin-walled hyphae consistently simple-septate............................Key Code 1.6.

Key Code 1.3.
Hyphae remaining thin-walled and undifferentiated......................Key Code 1.3.7.
Hyphae differentiated to form fiber hyphae (Figs. 8–12) alone or accompanied by other special structures (Code Symbols 9 to 26)...............................Key Code 1.3.8.
Hyphae differentiated to form nodose-septate hyphae with irregularly thickened walls (Figs. 13–16, 90, 92)...Key Code 1.3.9.
Hyphae differentiated to form distinctive hyphae with minute projections on walls (Fig. 47)...Key Code 1.3.20.
Hyphae differentiated to form sclerotia...................................Key Code 1.3.23.
Hyphae differentiated to form distinctive non-staining hyphae with walls slightly thickened and rigid and more or less right-angled branches (Fig. 67)...........Key Code 1.3.24.
Hyphae differentiated to form distinctive hyphae with non-staining, thick-walled terminal cells (Fig. 68)..Key Code 1.3.25.
Hyphae differentiated by the formation of noteworthy swellings, including lactiferous cells...Key Code 1.3.26.

Key Code 1.3.7.
Conidia, chlamydospores, and oidia lacking..........................Key Code 1.3.7.32.
Conidia present; chlamydospores and oidia lacking...................Key Code 1.3.7.33.
Conidia and chlamydospores present; oidia lacking................Key Code 1.3.7.33.34.
Conidia and oidia lacking; chlamydospores present...................Key Code 1.3.7.34.
Conidia lacking; chlamydospores and oidia present................Key Code 1.3.7.34.35.
Conidia and chlamydospores lacking; oidia present...................Key Code 1.3.7.35.

Key Code 1.3.7.32.
Fruiting within 6 weeks, the fruit body lamellate; distinctive hyphae with minute projections on side walls (20; Fig. 47) always present but easily overlooked; chlamydospores fairly numerous in some isolates, apparently lacking in others; tests for extracellular oxidase positive with tannic acid agar and guaiacum, negative with gallic acid agar.
1.(2).3.7.(20).32.(34).36.38.43.48.54.55.60. *Schizophyllum commune* Fr. (Nobles 1948, 1958*a*).
Fruiting within 6 weeks, the fruit body poroid, the basidia cruciately septate; occasional swellings on hyphae (26); hyphae with somewhat thickened walls, which may be interpreted as fiber hyphae (8); backward extensions on some clamp connections; tests for extracellular oxidase usually weakly positive, occasionally negative with gallic and tannic acid agars, positive with guaiacum.
1.(2).3.7.(8).(26).32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)
Fruiting within 6 weeks, the fruit body poroid, the basidia non-septate; basidiospores ellipsoid, 4.5–6.0 × 2.0–3.5 μ; tests for extracellular oxidase consistently negative.
1.3.7.32.36.38.44.45.48.55. *Poria sequoiae* Bonar (Nobles 1943)
Fruiting within 6 weeks, the fruit body poroid, the basidia non-septate; basidiospores oblong-ellipsoid, 4.5–6.0 × 3.0–3.5 μ; distinctive non-staining hyphae with walls somewhat thickened (25; Fig. 68) always present but may be overlooked or interpreted as hyphae

Key Code 1.3.7.32. (*Concluded*)

with irregularly thickened walls (9); chlamydospores rare or apparently lacking; tests for extracellular oxidase consistently negative.

1.3.7.(9).25.32.(34).36.38.43.44.48.54.55. *Poria xantha* (Fr.) Cooke (Nobles 1948)

Fruiting occasionally before the end of 6 weeks, the fruit body poroid on small compact balls of mycelium usually grown against side wall of Petri dish, the pore surface white, the basidia non-septate; basidiospores cylindric or allantoid, 3.5–5.0 × 1.0–2.0 μ; fiber hyphae rare or lacking but usually present in fruiting areas; chlamydospores rare or apparently lacking (interpreted as swellings (26) in description in 1948); tests for extracellular oxidase consistently negative.

1.3.7.(8).(26).32.(34).36.38.42.-44.(48).50.54.59. *Polyporus betulinus* Bull. ex Fr. (Nobles 1948)

Fruiting occasionally before the end of 6 weeks, the fruit body poroid, the pore surface reddish-purple, the basidia non-septate; basidiospores allantoid, 3.0–4.5 × 0.5–1.0 μ; reverse usually greenish-yellow; odor strong and disagreeable; tests for extracellular oxidase negative with gallic and tannic acid agars, negative to positive with guaiacum; causing white rot in test blocks, according to results privately communicated by J. K. Shields.

1.(2).3.7.32.36.38.42.43.(48).53.54.55. *Polyporus dichrous* Fr. (Nobles 1948, 1958*a*)

Not fruiting within 6 weeks; mats partly vivid yellow, silky to cottony, traversed by strands which expand to form fans of plumose mycelium at margin; reverse unchanged; plates covered in 5 to 6 weeks; distinctive hyphae with contents shrunk against side wall always present; tests for extracellular oxidase consistently negative.

1.3.7.(8).32.36.37.38.45.46.53.55.60. *Merulius lacrymans* Fr. (Nobles 1948)

Not fruiting within 6 weeks; mats white, appressed, farinaceous to woolly; reverse unchanged; plates not covered in 6 weeks; tests for extracellular oxidase consistently negative.

1.3.7.32.36.38.47.53.55. *Polyporus fragilis* Fr. (Nobles 1948)

Not fruiting within 6 weeks; mats white, raised, cottony or plumose; reverse unchanged; plates covered in 5 weeks; tests for extracellular oxidase consistently negative.

1.3.7.32.(34).36.38.45.54.55. *Polyporus subcartilagineus* Overh. (Nobles 1948)

Key Code 1.3.7.33.

Conidia borne singly at ends of conidiophores, the clamp connection at the base of the conidium proliferating to form a second short terminal cell and conidium, this process continuing until a small group of conidia is formed; conidia ovoid or truncate, 4.5–7.2 × 2.7–4.5 μ, with walls slightly thickened and greenish-yellow (Fig. 80); tests for extracellular oxidase negative with gallic and tannic acid agars, positive with guaiacum.

1.(2).3.7.33.36.37.38.44.45.54.55. *Polyporus guttulatus* Peck (Nobles 1948, 1958*a*)

Conidia borne singly at ends of sympodium-type conidiophores, truncate, 4.5–9.0 × 1.8–4.5 μ; sclerotia (23) usually present, alveolate, brown when mature, composed of crowded inflated cells; tests for extracellular oxidase negative with gallic and tannic acid agars, positive with guaiacum.

1.(2).3.7.(23).33.36.38.45.46.54.55. *Trechispora raduloides* (Karst.) Rogers (Maxwell 1954; Nobles 1958*a*)

Key Code 1.3.7.33.34.

Conidia borne singly at ends of narrow conidiophores, subglobose to ovoid, 4.5–7.5 × 3.0–4.4 μ; chlamydospores numerous, with fairly thick walls, 10.5–15.0 × 6.0–9.0 μ; similar to *Poria carbonica* below but without its distinctive non-staining hyphae with right-angled branches.

1.3.7.33.34.36.38.47.50.55. *Fomes officinalis* (Vill. ex Fr.) Faull (Nobles 1948)

Conidia borne singly at ends of narrow conidiophores, broadly ovoid, 7.5–9.0 × 4.5–7.5 μ (Fig. 86); chlamydospores numerous, with walls slightly thickened, 9.0–16.5 × 7.5–12.0 μ (Figs. 87, 97); distinctive non-staining hyphae with more or less right-angled branches, the walls slightly thickened and rigid, always present but may be overlooked (24; Fig. 67).

1.3.7.(24).33.34.36.38.44.-46.50.55. *Poria carbonica* Overh. (Nobles 1943, 1948)

Key Code 1.3.7.34.

Chlamydospores numerous on vegetative mycelium and embedded in fruit bodies, with walls conspicuously thickened, remaining hyaline, 5.4–10.6 × 5.4–8.2 μ; tests for extracellular oxidase consistently negative.

1.3.7.34.36.38.43.44.48.54.60. *Corticium vellereum* Ellis & Cragin (Nobles and Nordin 1955)

Chlamydospores numerous on vegetative mycelium, with walls somewhat thickened, remaining hyaline, 7.5–13.5 × 4.5–9.0 μ; tests for extracellular oxidase negative to weakly positive with gallic and tannic acid agars, positive with guaiacum.

1.(2).3.7.(26).34.36.38.43.44.48.53.54.60. *Polyporus fumosus* Pers. ex Fr. (Nobles 1948, 1958*a*)

Key Code 1.3.7.34. (*Concluded*)

Chlamydospores numerous on vegetative mycelium, intercalary or terminal, the latter occurring singly or in spraylike clusters, when mature thick-walled with buffy-brown contents, imparting brown color to mat, 7.5–16.5 × 4.5–9.0 μ (Fig. 88); tests for extracellular oxidase negative with gallic and tannic acid agars (may be slight browning with gallic acid agar), positive with guaiacum.

1.(2).3.7.34.36.37.38.39.44.–46.(48).52.(54).55. *Polyporus balsameus* Peck (Nobles 1948, 1958*a*)

Chlamydospores numerous on vegetative mycelium, usually terminal, when mature thick-walled with golden-brown contents, 9.0–12.0 × 9.0–10.5 μ; septation of hyphae variable, with regular clamp connections and simple septa both present, even on the same hypha; yellow fiberlike hyphae with expanded tips (Fig. 20) frequently present; tests for extracellular oxidase consistently negative.

1.3.(4).(5).7.(8).34.37.39.47.53.55. *Stereum abietinum* Pers. (Nobles 1948)

Chlamydospores fairly numerous to rare or apparently lacking. (See Key Code 1.3.7.32.)

1.(2).3.7.(20).(32).34.36.38.43.48.54.55.60. *Schizophyllum commune* Fr. (Nobles 1948, 1958*a*)

1.3.7.(32).34.36.38.45.54.55. *Polyporus subcartilagineus* Overh. (Nobles 1948)

1.3.7.(9).(25).(32).34.36.38.43.44.48.54.55. *Poria xantha* (Fr.) Cooke (Nobles 1948)

1.3.7.(8).(26).(32).34.36.38.42.–44.(48).50.54.59. *Polyporus betulinus* Bull. ex Fr. (Nobles 1948)

Key Code 1.3.7.34.35.

Mats vivid yellow, orange, or brown, at least in part; chlamydospores rare or apparently lacking, thin-walled, 7.5–16.5 × 5.0–9.0 μ; oidia numerous, formed by fragmentation of nodose-septate hyphae (Fig. 64); yellow or brown fiber hyphae (8) usually present; fruit bodies frequently formed; odor slightly spicy.

1.3.7.(8).34.35.37.38.44.–47.(48).53.54.55.59. *Lenzites saepiaria* (Wulf. ex Fr.) Fr. (Nobles 1948)

Mats vivid yellow, orange, or brown, at least in part; chlamydospores numerous in submerged mycelium, thin-walled, 10.0–18.0 × 6.0–10.5 μ; oidia numerous, formed by fragmentation of nodose-septate hyphae; yellow or brown fiber hyphae (8) usually present; fruit bodies usually formed; odor very strong, suggesting garlic.

1.3.7.(8).34.35.37.38.43.44.(48).53.54.55.59. *Lenzites trabea* Pers. ex Fr. (Nobles 1948)

Mats white or dull yellow; chlamydospores fairly numerous, thin-walled, 9.0–21.0 × 7.5–10.5 μ; oidia numerous, formed by fragmentation of simple-septate hyphae which form sectors in newly isolated cultures but which frequently replace nodose-septate hyphae in old cultures; odor sweet.

1.3.(6).7.34.35.36.38.44.–46.50.55.59. *Trametes odorata* (Wulf. ex Fr.) Fr. (Nobles 1948, 1958*a*, as *Trametes americana* Overh.)

Mats white; chlamydospores rare or apparently lacking, thin-walled; oidia formed by fragmentation of nodose-septate hyphae or of simple-septate branches from nodose-septate hyphae (Fig. 66); odor slightly fragrant.

1.(2).3.7.34.35.36.38.40.42.50.54.55.59. *Polyporus adustus* Willd. ex Fr. (Nobles 1948, 1958*a*)

Key Code 1.3.7.35.

Mats vivid yellow, orange, or brown, at least in part. (See Key Code 1.3.7.34.35. for description.)

1.3.7.(8).(34).35.37.38.44.–47.(48).53.54.55.59. *Lenzites saepiaria* (Wulf. ex Fr.) Fr. (Nobles 1948)

Mats yellow or brown mixed with white and so appearing pale in color; oidia numerous, formed by fragmentation of simple-septate branches from nodose-septate hyphae; lactiferous cells (26) observed in some isolates; odor strong, suggesting iodoform.

1.(2).3.7.(26).35.36.37.38.43.52.54.60. *Collybia velutipes* (Curt. ex Fr.) Kummer (Nobles 1948, 1958*a*)

Mats white. (See Key Code 1.3.7.34.35. for description.)

1.(2).3.7.(34).35.36.38.40.42.50.54.55.59. *Polyporus adustus* Willd. ex Fr. (Nobles 1948, 1958*a*)

Key Code 1.3.8.

Fiber hyphae accompanied by nodose-septate hyphae with walls irregularly thickened (Figs. 13–16, 90, 92)..Key Code 1.3.8.9.

Fiber hyphae accompanied by nodose-septate hyphae with noteworthy swellings..Key Code 1.3.8.26

Fiber hyphae present alone, unaccompanied by other special structures; conidia, chlamydospores, and oidia lacking....................................Key Code 1.3.8.32.

Key Code 1.3.8. (*Concluded*)

Fiber hyphae present alone, unaccompanied by other special structures; conidia lacking; chlamydospores and (or) oidia present......................Key Code 1.3.8.34.35.

Key Code 1.3.8.9.

Mats pink or vinaceous, cottony to cottony-floccose and pitted, with poroid areas over inoculum after 1 to 2 weeks and covering most of the surface after 6 weeks, waxy, the dissepiments thick and pores small; hyphae with walls irregularly thickened (Fig. 16); chlamydospores rare, thin-walled, 10.5–24.0 × 6.0–7.5 μ; basidiospores 6.0–8.0 × 1.5–2.0 μ.

1.(2).3.8.9.34.36.38.43.44.48.50.(54).55.59. *Fomes cajanderi* Karst. (Nobles 1948, 1958*a*, as *Fomes subroseus* (Weir) Overh.)

Mats white, woolly-felty, with slightly raised reticulations, frequently fruiting over raised tufts after 6 weeks; chlamydospores numerous, broadly ovoid, with thick walls, 12.0–18.0 μ diameter; hyphae with walls irregularly thickened (Fig. 15); basidiospores 6.0–8.0 × 2.5–3.0 μ.

1.3.8.9.34.36.38.44.(48).50.54. *Daedalea quercina* L. ex Fr. (Nobles 1948)

Mats white, woolly-cottony or woolly-felty, with extensive poroid fruiting areas after 3 weeks in some isolates; chlamydospores numerous, thick-walled, ellipsoid, 8.0–14.0 × 5.0–9.0 μ; basidiospores cylindrical, 7.2–10.4 × 3.0–4.0 μ, single spores germinating to give nodose-septate mycelium (57).

1.3.8.9.34.36.38.46.47.(48).53.54.57. *Coriolellus malicola* (Berk. & Curt.) Murr. (Sarkar 1959)

Mats white, thick, woolly or cottony-woolly, often zonate with age, with roll of white woolly mycelium against side wall of Petri dish, with poroid fruiting areas after 6 weeks in some isolates over zone of newest growth, the pores shallow, with thick dissepiments; nodose-septate hyphae with walls irregularly thickened (Fig. 92); no chlamydospores; basidiospores cylindrical, 10.0–13.0 × 3.5–4.8 μ.

1.3.8.9.32.36.38.45.46.(48).(54).55.59. *Coriolellus heteromorphus* (Fr.) Bond. & Sing. (Nobles 1948, as *Trametes heteromorpha* (Fr.) Bres.; Sarkar 1959)

Mats white, mostly downy-woolly or woolly, thin and translucent but with conspicuous narrow to broad zones of opaque white, woolly-felty mycelium, with poroid fruiting areas in most isolates after 3 to 5 weeks, the dissepiments thick; nodose-septate hyphae with walls irregularly thickened (Fig. 13); no chlamydospores; walls of basidia and lanceolate cystidioles usually thickened laterally, especially near the base; basidiospores cylindrical-ellipsoid, (6.0–)7.0–11.0 × 3.2–4.5 μ.

1.3.8.9.32.36.38.44.45.(48).54.55. *Coriolellus sepium* (Berk.) Murr. (Nobles 1948; Bakshi, Singh, and Gibson 1958, as *Trametes sepium* Berk.; Sarkar 1959)

Mats white, at first downy, soon changing to felty, with well-developed poroid fruiting areas in most isolates, appearing first around the inoculum and extending over the whole felty area within 2 to 3 weeks; fiber hyphae numerous (Fig. 9); chlamydospores rare or apparently lacking, fairly thick-walled, 15.0–20.0 × 5.3–7.0 μ; basidiospores cylindrical, 6.5–8.5 × 2.5–3.5 μ.

1.3.8.9.32.34.36.38.45.46.48.(54).55.59. *Coriolellus serialis* (Fr.) Murr. (Nobles 1943, 1948, as *Trametes serialis* Fr.; Sarkar 1959)

Mats white, at first thin, woolly, becoming thicker, woolly-felty or felty in small areas or over most of surface, with pores usually developing after 5 or 6 weeks; chlamydospores rare or apparently lacking, ellipsoid, thin-walled, 14.3–22.0 × 5.3–7.5 μ; cystidioles present in the hymenium, narrow-lanceolate, the walls remaining thin; basidiospores short-cylindrical, 3.0–4.5 × 1.5–2.2 μ.

1.3.8.9.32.34.36.38.44.–46.(48).55.58. *Coriolellus sinuosus* (Fr.) Sarkar (Sarkar 1959)

Mats white at first, downy to thin-woolly, forming tufts which coalesce to produce white to pale pinkish-buff, felty-pellicular areas over older part, with poroid fruiting areas in some isolates after 5 to 6 weeks, at first over the inoculum, later covering the felty areas; no chlamydospores; basidiospores cylindrical, 7.0–9.5 × 2.5–3.5 μ.

1.3.8.9.32.36.38.46.47.(48).53.(54).55.59. *Coriolellus variiformis* (Peck) Sarkar (Nobles 1948, as *Trametes variiformis* Peck; Sarkar 1959)

Key Code 1.3.8.26.

Fruiting within 6 weeks, the fruit body poroid, the basidia cruciately septate; occasional swellings on hyphae, terminal or intercalary, up to 12.0 μ diameter.

1.(2).3.(7).8.26.32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

Fruiting occasionally before the end of 6 weeks, the fruit body poroid, the basidia non-septate; chlamydospores rare or apparently lacking (interpreted as swellings (26) in description in 1948).

1.3.(7).8.26.32.34.36.38.42.–44.(48).50.54.59. *Polyporus betulinus* Bull. ex Fr. (Nobles 1948)

(See Key Code 1.3.7.32. for more detailed descriptions.)

Key Code 1.3.8.32.

Mats pink or vinaceous, downy or farinaceous, becoming more compact, felty, forming granular or irregularly poroid fruiting surfaces after 3 to 4 weeks; tests for extracellular oxidase negative to weakly positive with gallic and tannic acid agars, negative with guaiacum; associated with brown cubical rot of coniferous or, rarely, broad-leaved trees.

1.(2).3.8.32.36.38.39.43.48.54.55.59. *Fomes roseus* (Alb. & Schw. ex Fr.) Karst. (Nobles 1948, 1958*a*)

Mats white, thin-felty, bearing poroid fruit bodies, the basidia cruciately septate; tests for extracellular oxidase usually weakly positive, occasionally negative with gallic and tannic acid agars, positive with guaiacum. (See Key Code 1.3.7.32. for more detailed description).

1.(2).3.(7).8.(26).32.36.38.44.–47.48.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

Mats white, at first slightly raised, cottony to floccose, becoming appressed, subfelty and translucent except for scattered small areas of more compact mycelium and, in some isolates, small compact balls of mycelium, usually grown against side wall of Petri dish, bearing poroid fruiting areas; basidia non-septate; fiber hyphae rare or lacking but usually present in fruiting areas; chlamydospores rare or lacking (interpreted as swellings (26) in description in 1948); no oidia; tests for extracellular oxidase consistently negative.

1.3.(7).8.(26).32.(34).36.38.42.–44.(48).50.54.59. *Polyporus betulinus* Bull. ex Fr. (Nobles 1948)

Mats white, usually uniform in appearance, slightly raised, cottony or cottony-woolly, not fruiting before the end of 6 weeks; fiber hyphae numerous, hyaline; chlamydospores numerous in some isolates, rare or apparently lacking in others, usually limited to the advancing zone, especially in mycelium grown against side wall remote from inoculum, with walls thin or slightly thickened, 6.0–18.0 × 6.0–9.0 μ; no oidia; tests for extracellular oxidase consistently negative.

1.3.8.32.(34).36.38.43.–46.54.55.59. *Fomes pinicola* (Sw. ex Fr.) Cooke (Nobles 1948)

Mats white, downy to downy-floccose, becoming thin-felty in older parts of some isolates, with scattered, small, raised balls of compact mycelium forming after 2 to 3 weeks, gradually increasing in size and coalescing, with surface at first floccose, later compact and covered with more or less regular pores; basidia non-septate; fiber hyphae numerous, hyaline; chlamydospores usually present, rare to numerous, thin-walled, 10.5–19.5 × 7.5–12.0 μ; tests for extracellular oxidase consistently negative; associated with decay in broad-leaved and coniferous trees (McKay 1962).

1.3.8.32.(34).36.38.43.44.48.54.55.59. *Polyporus palustris* Berk. & Curt. (Nobles 1943, 1948)

Mats white, slightly raised, cottony-woolly, frequently with strands originating at inoculum and extending across surface or around edge of Petri dish and expanding to form plumose structures, these usually bearing fragile, poroid fruiting surfaces after 3 to 4 weeks; basidia non-septate; fiber hyphae numerous; tests for extracellular oxidase consistently negative.

1.3.8.32.36.38.43.44.48.55. *Poria vaillantii* (Fr.) Cooke (Nobles 1948)

Mats partly vivid yellow, silky to cottony, traversed by strands which expand to form fans of plumose mycelium at margin; fiberlike hyphae with walls somewhat thickened may occur (8); distinctive hyphae with contents shrunk against wall always present; tests for extracellular oxidase consistently negative.

1.3.(7).8.32.36.37.38.45.46.53.55.60. *Merulius lacrymans* Fr. (Nobles 1948)

Key Code 1.3.8.(34).(35).

Mats white. (For descriptive key, see Key Code 1.3.8.32.)

1.3.(7).8.(26).(32).34.36.38.42.–44.(48).50.54.59. *Polyporus betulinus* Bull. ex Fr. (Nobles 1948)

1.3.8.(32).34.36.38.43.–46.54.55.59. *Fomes pinicola* (Sw. ex Fr.) Cooke (Nobles 1948)

1.3.8.(32).34.36.38.43.44.48.54.55.59. *Polyporus palustris* Berk. & Curt. (Nobles 1943, 1948)

Mats vivid yellow, orange, or brown, at least in part. (For descriptive key, see Key Code 1.3.7.34.35.)

1.3.(7).8.34.35.37.38.44.–47.(48).53.54.55.59. *Lenzites saepiaria* (Wulf. ex Fr.) Fr. (Nobles 1948)

1.3.(7).8.34.35.37.38.43.44.(48).53.54.55.59. *Lenzites trabea* Pers. ex Fr. (Nobles 1948)

Mats very thin, yellow or brown, over brown agar.

1.3.(4).(5).(7).8.34.37.39.47.53.55. *Stereum abietinum* Pers. (Nobles 1948) (See Key Code 1.3.7.34. for description.)

Key Code 1.3.9.

Mats white, at first cottony-floccose, becoming more compact, woolly-felty over whole surface or in patches; no fruiting; nodose-septate hyphae with irregularly thickened walls (omitted from 1948 description) conspicuous, often swollen at septa; chlamydospores numerous in most isolates, the walls thick and frequently rough, 7.5–21.0 × 4.5–12.0 μ (Fig. 89); odor of iodoform strong in young cultures.

1.3.9.26.34.36.38.45.–47.52.54.55. *Poria sericeomollis* (Rom.) Egel. (Nobles 1948, as *Poria asiatica* (Pil.) Overh.)

Mats white or tinged with pinkish-buff, slightly raised, loosely arranged, cottony to woolly, frequently grown against sides of Petri dish and across lid, forming scattered fruit bodies after 2 to 3 weeks in some isolates, these consisting of waxy granules or plates coalescing to form foliose or, more rarely, irregularly poroid fruit bodies; hyphae with irregularly thickened walls (Fig. 14); chlamydospores rare to numerous, with walls slightly thickened, 8.0–19.5 × 6.0–13.5 μ; no odor.

1.3.9.34.36.38.42.–44.(48).54.55.59. *Poria placenta* (Fr.) Cooke (Nobles 1943, as *Poria microspora* Overh., 1948, as *Poria monticola* Murr.)

Mats white, at first raised, loosely arranged, cottony, then collapsed, appressed, subfelty, with cottony mycelium grown against side wall of Petri dish remote from inoculum, usually forming fruit bodies with minute pores after 5 to 6 weeks; chlamydospores rare or apparently lacking, with walls slightly thickened, 10.5–19.5 × 6.0–7.5 μ; distinctive non-staining hyphae with walls somewhat thickened (25; Fig. 68) always present but may be interpreted as nodose-septate hyphae with irregularly thickened walls (9); no odor.

1.3.(7).9.25.32.34.36.38.43.44.48.54.55. *Poria xantha* (Fr.) Cooke (Nobles 1948)

Key Code 1.3.20.

1.(2).3.(7).20.32.34.36.38.43.48.54.55.60. *Schizophyllum commune* Fr. (Nobles 1948, 1958*a*)

(For description, see Key Code 1.3.7.32.)

Key Code 1.3.23.

1.(2).3.(7).23.33.36.38.45.46.54.55. *Trechispora raduloides* (Karst.) Rogers (Maxwell 1954; Nobles 1958*a*)

(For description, see Key Code 1.3.7.33.)

Key Code 1.3.24.

1.3.(7).24.33.34.36.38.44.–46.50.55. *Poria carbonica* Overh. (Nobles 1943, 1948)

(For description, see Key Code 1.3.7.33.34.)

Key Code 1.3.25.

1.3.(7).(9).25.32.34.36.38.43.44.48.54.55. *Poria xantha* (Fr.) Cooke (Nobles 1948)

(For description, see Key Code 1.3.7.32.)

Key Code 1.3.26.

Swellings up to 15.0 μ diameter on hyphae (omitted from 1948 description); chlamydospores numerous, with walls somewhat thickened, 7.5–13.5 × 4.5–9.0 μ; no oidia; tests for extracellular oxidase negative to weakly positive with gallic and tannic acid agars, positive with guaiacum.

1.(2).3.(7).26.34.36.38.43.44.48.53.54.60. *Polyporus fumosus* Pers. ex Fr. (Nobles 1948, 1958*a*)

Occasional swellings up to 12.0 μ diameter on hyphae; no chlamydospores; no oidia; tests for extracellular oxidase usually weakly positive, occasionally negative with gallic and tannic acid agars, positive with guaiacum.

1.(2).3.(7).(8).26.32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

Swellings which suggest chlamydospores but which remain thin-walled and eventually become empty and collapsed; chlamydospores rare or lacking; no oidia; tests for extracellular oxidase consistently negative.

1.3.(7).(8).26.32.(34).36.38.42.–44.(48).50.54.59. *Polyporus betulinus* Bull. ex Fr. (Nobles 1948)

Lactiferous cells (26) observed in one isolate; no chlamydospores; oidia formed by fragmentation of simple-septate branches from nodose-septate hyphae; tests for extracellular oxidase on gallic acid agar and guaiacum negative to weakly positive, on tannic acid agar negative.

1.(2).3.(7).26.35.36.37.38.43.52.54.60. *Collybia velutipes* (Curt. ex Fr.) Kummer (Nobles 1948, 1958*a*)

Key Code 1.4.

Septation of hyphae variable, with clamp connections and simple septa both present, even on one hypha; chlamydospores numerous, usually terminal, when mature thick-walled with golden brown contents, 9.0–12.0 × 9.0–10.5 μ; yellowish fiberlike hyphae with expanded tips (Fig. 20) frequently present.

1.(3).4.(5).7.(8).34.37.39.47.53.55. *Stereum abietinum* Pers. (Nobles 1948)

Septation consistent, with simple-septate hyphae in the advancing zone, nodose-septate hyphae elsewhere; chlamydospores rare to fairly numerous, with walls somewhat thickened, hyaline, 10.5–16.5 × 7.5–13.5 μ.

1.4.8.(26).34.36.38.43.44.(48).53.55. *Lentinus lepideus* Fr. (Nobles 1948, 1958*a*)

Septation consistent, with simple-septate hyphae in the advancing zone, nodose-septate hyphae elsewhere; no chlamydospores.

1.4.8.32.36.38.44.45.53.55. *Lentinus kauffmanii* A. H. Smith (Bier and Nobles 1946; Nobles 1948)

Key Code 1.5.

Single and double clamp connections present; mats white and reverse unchanged in color; chlamydospores and oidia lacking.

1.5.7.32.36.38.42.55. *Poria taxicola* (Pers.) Cooke (Nobles 1948, as *Poria rufa* (Schrad. ex Fr.) Cooke)

Multiple clamp connections usually numerous; mats and reverse brown, at least in part; chlamydospores lacking and oidia rare or apparently lacking; distinctive hyphae with contents shrunk against wall always present; hyphae with adherent brown resinous masses (21) usually present.

1.5.(7).(21).(32).(35).36.37.38.39.42.53.54.55.57. *Coniophora puteana* (Schum. ex Fr.) Karst. (Nobles 1948)

Single or multiple clamp connections rare or apparently lacking (Fig. 7); chlamydospores lacking; oidia numerous (Fig. 65); mats white and reverse unchanged in color; tests for extracellular oxidase positive with gallic acid agar and guaiacum, negative with tannic acid agar.

1.(2).5.(6).7.35.36.38.42.43.53.55. *Peniophora gigantea* (Fr.) Massee (Nobles 1948, 1958*a*)

Clamp connections single, usually numerous but erratically distributed, with clamp connections and simple septa occurring in the same hypha; chlamydospores numerous, usually terminal, when mature thick-walled with golden brown contents; yellowish fiberlike hyphae with expanded tips (Fig. 20) frequently present; mats and reverse brown, at least in part.

1.(3).(4).5.7.(8).34.37.39.47.53.55. *Stereum abietinum* Pers. (Nobles 1948)

Key Code 1.6.

Hyphae remaining thin-walled and undifferentiated .... Key Code 1.6.7.

Hyphae differentiated to form fiber hyphae, alone or accompanied by other special structures .... Key Code 1.6.8.

Hyphae differentiated to form cystidia, restricted to fruiting areas .... Key Code 1.6.14.

Key Code 1.6.7.

Conidia, chlamydospores, and oidia lacking; mats white but with brown or vinaceous color of agar showing through thin mats.

1.6.7.32.36.37.38.39.44.53.55. *Polyporus mollis* Pers. ex Fr. (Nobles 1948)

Conidia present, numerous, borne singly at ends of conidiophores branched in spraylike manner (Figs. 83, 96), broadly ovoid to subglobose, 6.0–9.0 × 6.0–7.5 μ; chlamydospores fairly numerous, with walls slightly thickened, terminal and intercalary, 12.0–19.5 × 7.5–13.5 μ (Fig. 84); mats "pale ochraceous-buff" to "pale ochraceous-salmon"; agar unchanged in color.

1.6.7.33.34.36.38.43.44.54.55. *Polyporus sulphureus* Bull. ex Fr. (Nobles 1948)

Conidia lacking; chlamydospores numerous in some isolates, rare or apparently lacking in others, hyaline or brown, concolorous with hyphae in which they are formed, thick-walled, globose to ovoid, 10.5–16.5 μ diameter; mats greenish-yellow to brown; agar yellow to brown; tests for extracellular oxidase with gallic and tannic acid agars negative, with guaiacum positive; associated with brown cubical rot.

1.(2).6.7.32.34.37.38.39.42.–44.50.54.55. *Polyporus schweinitzii* Fr. (Nobles 1948, 1958*a*)

Conidia lacking; chlamydospores fairly numerous, thin-walled, hyaline, 9.0–21.0 × 7.5–10.5 μ; oidia numerous, formed by fragmentation of simple-septate hyphae which form sectors in newly isolated cultures and frequently replace nodose-septate hyphae in old cultures; mats white and agar unchanged; tests for extracellular oxidase consistently negative.

1.(3).6.7.34.35.36.38.44.–46.50.55.59. *Trametes odorata* (Wulf. ex Fr.) Fr. haploid condition (Nobles 1948, as *Trametes americana* Overh.)

Key Code 1.6.7. (*Concluded*)

Conidia and chlamydospores lacking; oidia numerous (Fig. 65); mats white and agar unchanged in color; tests for extracellular oxidase with gallic acid agar and guaiacum positive, with tannic acid agar negative.

1.(2).(5).6.7.35.36.38.42.43.53.55. *Peniophora gigantea* (Fr.) Massee (Nobles 1948, 1958*a*)

Conidia, chlamydospores, and oidia lacking; hyphae simple-septate (Fig. 3); fiber hyphae numerous in some isolates, rare or apparently lacking in others; mats white and agar bleached; tests for extracellular oxidase negative to weakly positive with gallic and tannic acid agars, positive with guaiacum; associated with white rot.

1.(2).6.7.(8).14.32.36.40.42.43.(48).53.54. *Polyporus tulipiferae* (Schw.) Overh. (Nobles 1948, 1958*a*)

Key Code 1.6.8.

1.(2).6.(7).8.14.32.36.40.42.43.(48).53.54. *Polyporus tulipiferae* (Schw.) Overh. (Nobles 1948, 1958*a*)

(See Key Code 1.6.7. for description)

Key Code 1.6.14.

Mats appressed to slightly raised, floccose to cottony, fruiting over granules and incomplete pores after 2 to 3 weeks; cystidia numerous in hymenium, cylindrical, thin-walled (Fig. 31).

1.6.14.32.36.38.43.44.48.53.54.55. *Polyporus fibrillosus* Karst. (Nobles 1948)

Key Code 2.

Thin-walled hyphae consistently nodose-septate.......................... Key Code 2.3.

Thin-walled hyphae simple-septate in the advancing zone, nodose-septate elsewhere.. Key Code 2.4.

Thin-walled hyphae mainly simple-septate but with occasional single or multiple clamp connections.. Key Code 2.5.

Thin-walled hyphae consistently simple-septate.......................... Key Code 2.6.

Key Code 2.3.

Hyphae remaining thin-walled and undifferentiated...................... Key Code 2.3.7.

Hyphae differentiated to form fiber hyphae (Figs. 8–12) alone or accompanied by other special structures (Code Symbols 9 to 26)............................... Key Code 2.3.8.

Hyphae differentiated to form nodose-septate hyphae with irregularly thickened walls (Figs. 13–16, 90, 92) or with refractive areas on walls...................... Key Code 2.3.9.

Hyphae differentiated to form cuticular cells closely packed to form skinlike areas (Figs. 48–55).. Key Code 2.3.10.

Hyphae differentiated to form numerous, short, interlocking branches or nodules forming skinlike areas (Figs. 56–63).................................... Key Code 2.3.11.

Hyphae differentiated to form numerous, contorted, incrusted hyphal tips (Figs. 42–44).. Key Code 2.3.12.

Hyphae differentiated to form cystidia on vegetative mycelium, capitate or cylindrical, incrusted (Figs. 17–23)... Key Code 2.3.13.

Hyphae differentiated to form cystidia and (or) gloeocystidia in fruiting areas (Figs. 24–41).. Key Code 2.3.14.15.

Hyphae differentiated to form conspicuous strands or rhizomorphs....... Key Code 2.3.16.

Hyphae differentiated to form distinctive hyphae with minute projections on walls (Figs. 45, 47)... Key Code 2.3.20.

Hyphae differentiated to form sclerotia................................ Key Code 2.3.23.

Hyphae differentiated to form noteworthy swellings, including allocysts (Figs. 73, 94)... Key Code 2.3.26.

Key Code 2.3.7.

Conidia, chlamydospores, and oidia lacking.......................... Key Code 2.3.7.32.

Conidia present; chlamydospores and oidia present or lacking......... Key Code 2.3.7.33.

Conidia lacking; chlamydospores present; oidia present or lacking...... Key Code 2.3.7.34.

Conidia and chlamydospores lacking; oidia present................... Key Code 2.3.7.35.

Key Code 2.3.7.32.

Fruiting within 6 weeks, the fruit body lamellate; distinctive hyphae with minute projections along walls (20; Fig. 47) always present but easily overlooked; chlamydospores fairly numerous in some isolates, apparently lacking in others; tests for extracellular oxidase positive with tannic acid agar and guaiacum, negative with gallic acid agar.

(1).2.3.7.(20).32.(34).36.38.43.48.54.55.60. *Schizophyllum commune* Fr. (Nobles 1948, 1958*a*)

Key Code 2.3.7.32. (*Concluded*)

Fruiting within 6 weeks, the fruit body poroid, the basidia cruciately septate; occasional swellings on hyphae (26); hyphae with somewhat thickened walls, which may be interpreted as fiber hyphae (8); backward extensions on some clamp connections; tests for extracellular oxidase usually weakly positive, occasionally negative with gallic and tannic acid agars, positive with guaiacum.

(1).2.3.7.(8).(26).32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

Fruiting occasionally before the end of 6 weeks, the fruit body poroid, the pore surface reddish-purple, the basidia non-septate; basidiospores allantoid, 3.0–4.5 × 0.5–1.0 μ; reverse usually greenish-yellow; odor strong and disagreeable; tests for extracellular oxidase negative with gallic and tannic acid agars, negative to positive with guaiacum; causing white rot in test blocks, according to results privately communicated by J. K. Shields.

(1).2.3.7.32.36.38.42.43.(48).53.54.55. *Polyporus dichrous* Fr. (Nobles 1948, 1958*a*)

Fruiting occasionally before the end of 6 weeks, the fruit body poroid, the pore surface white, the basidia non-septate; growth very slow, radius 6 cm or less in 6 weeks; mats thin and white, agar unchanged; tests for extracellular oxidase consistently positive.

2.3.7.32.36.38.47.(48).53.54. *Fomes ohiensis* (Berk.) Murr. (Nobles 1948)

Fruiting occasionally before the end of 6 weeks, the fruit body smooth, the basidia non-septate; the septation of hyphae diagnostic, with clamp connections rare to numerous, simple septa rare to numerous; the network of narrow hyphae, the smooth appearance of the mat and its toughness suggest relationship with *Peniophora sensu stricto* (Code 2.3.14.15.); tests for extracellular oxidase consistently positive.

2.3.(5).7.32.36.39.40.43.(48).55.60. *Peniophora piceae* (Pers.) Eriksson (Nobles 1956, as *Peniophora separans* Burt)

No fruiting; brown thonglike lines or small pseudoparenchymatous areas composed of interlocking hyphae usually occur but may be lacking or overlooked; tests for extracellular oxidase consistently positive.

2.3.7.(11).32.36.37.38.44.45.53.54.55.56. *Collybia radicata* (Fr.) Quél. (Nobles 1948)

Key Code 2.3.7.33.

Conidiophores oedocephaloid, conidia teardrop-shaped, apiculate, rounded at distal end, 4.9–7.0 × 2.7–3.6 μ; growth slow, radius 4–5 cm in 6 weeks; restricted to coniferous trees.

2.3.7.33.36.39.47.52.55. *Corticium furfuraceum* Bres. (Maxwell 1954)

Conidiophores oedocephaloid, conidia subglobose, apiculate, 1.9–3.7 μ diameter; growth moderately rapid to slow, plates covered in 4 to 6 weeks; restricted to coniferous trees.

2.3.7.33.34.36.38.44.–46.55.59. *Vararia granulosa* (Pers. ex Fr.) Laurila (Maxwell 1954)

Conidiophores oedocephaloid, conidia cylindrical, slightly curved, 9.0–15.0 × 2.7–3.6 μ; usually fruiting before the end of 6 weeks, with cystidia and gloeocystidia in hymenium (Figs. 28,41); growth rapid, plates covered in 3 to 4 weeks; restricted to broad-leaved trees.

2.3.7.(14).(15).33.36.38.40.43.44.48.54.59. *Peniophora heterocystidia* Burt (McKeen 1952)

Conidiophores oedocephaloid, conidia cylindrical or slightly curved, 10.0–18.9 × 2.7–4.5 μ; growth rapid, plates covered in 3 to 4 weeks; restricted to broad-leaved trees.

2.3.7.33.36.40.43.44.54.59. *Peniophora mutata* (Peck) Höhn. & Litsch. (McKeen 1952)

Conidiophores oedocephaloid, conidia cylindrical to slightly curved, 11.7–17.1 × 3.6–4.0 μ; growth rapid, plates covered in 3 weeks; restricted to *Populus* spp.

2.3.7.33.36.38.40.43.54.59. *Peniophora populnea* (Peck) Burt (McKeen 1952)

Conidiophores in sympodial arrangement, conidia truncate, 4.5–9.0 × 1.8–4.5 μ; sclerotia usually present, alveolate, brown when mature, composed of crowded, inflated cells.

(1).2.3.7.(23).33.36.38.45.46.54.55. *Trechispora raduloides* (Karst.) Rogers (Maxwell 1954; Nobles 1958*a*)

Conidiophores bottlebrush-like (Fig. 85); conidia globose, apiculate, 2.0–3.0 diameter, borne singly on short sterigmatoid projections which are crowded over terminal portion of conidiophore; fruiting limited to scattered basidia, in small tufts.

2.3.7.33.36.37.38.44.48.53.54.55. *Polyporus nidulans* Fr. (Nobles 1948, as *Polyporus rutilans* Pers. ex Fr.)

Conidiophores in small fascicles, the clamp connection at the base of the terminal conidium proliferating to form a second short terminal cell and conidium, this process continuing until a small group of conidia is formed (Fig. 80); conidia with walls slightly thickened, pale greenish-yellow, ovoid or truncate, 4.5–7.2 × 2.7–4.5 μ.

(1).2.3.7.33.36.37.38.44.45.54.55. *Polyporus guttulatus* Peck (Nobles 1948, 1958*a*)

Conidiophores in small fascicles, the terminal conidium cut off by a simple septum below which the conidiophore proliferates to form another short branch and terminal conidium, this process continuing until a small group of conidia is produced; conidia hyaline to yellow,

Key Code 2.3.7.33. (*Concluded*)

variable in size and shape but typically cylindrical with proximal end straight and distal end rounded, 5.4–11.7 × 2.7–4.5 μ (Fig. 79).

2.3.7.33.36.37.38.44.45.51.54.55.59. *Pholiota aurivella* (Batsch ex Fr.) Kummer (Nobles 1948, as *Pholiota adiposa* Fr.)

Key Code 2.3.7.34.

Fruiting within 6 weeks, the fruit bodies lamellate; distinctive hyphae with minute projections along walls (20; Fig. 47) always present but easily overlooked; chlamydospores fairly numerous in some isolates, apparently lacking in others, 6.0–15.0 × 4.5–7.5 μ; tests for extracellular oxidase positive with tannic acid agar and guaiacum, negative with gallic acid agar.

(1).2.3.7.(20).(32).34.36.38.43.48.54.55.60. *Schizophyllum commune* Fr. (Nobles 1948, 1958*a*)

Fruit body fundaments occasionally formed before the end of 6 weeks; chlamydospores numerous, 7.5–12.0 × 6.0–9.0 μ; tests for extracellular oxidase consistently positive.

2.3.7.34.36.37.38.43.(48).53.54.60. *Lentinus tigrinus* Bull. ex Fr. (Nobles 1948)

Fruiting within 6 weeks, the fruit body poroid; chlamydospores numerous, 7.5–13.5 × 4.5–9.0 μ; oidia lacking; occasional swellings up to 15.0 μ diameter on hyphae (26); tests for extracellular oxidase negative to weakly positive with gallic and tannic acid agars, positive with guaiacum.

(1).2.3.7.(26).34.36.38.43.44.48.53.54.60. *Polyporus fumosus* Pers. ex Fr. (Nobles 1948, 1958*a*)

Fruiting occasionally before the end of 6 weeks, the fruit body poroid; chlamydospores numerous, when mature thick-walled with brown contents, 7.5–16.5 × 4.5–9.0 μ (Fig. 88); tests for extracellular oxidase negative to weakly positive with gallic acid agar, negative with tannic acid agar, positive with guaiacum; associated with brown rot.

(1).2.3.7.34.36.37.38.39.44.–46.(48).52.54.55. *Polyporus balsameus* Peck (Nobles 1948, 1958*a*)

No fruiting; chlamydospores rare or apparently lacking, thin-walled, hyaline; oidia formed by fragmentation of nodose-septate hyphae or of simple-septate branches from nodose-septate hyphae (Fig. 66).

(1).2.3.7.34.35.36.38.40.42.50.54.55.59. *Polyporus adustus* Willd. ex Fr. (Nobles 1948, 1958*a*)

Key Code 2.3.7.35.

Oidia formed by fragmentation of simple-septate branches from nodose-septate hyphae; plates covered in 3 weeks; mats finally yellow to brown; tests for extracellular oxidase negative to positive with gallic acid agar and guaiacum, negative with tannic acid agar.

(1).2.3.7.(26).35.36.37.38.43.52.54.60. *Collybia velutipes* (Curt. ex Fr.) Kummer (Nobles 1948, 1958*a*)

Oidia formed by fragmentation of nodose-septate hyphae or of simple-septate branches (Fig. 66); plates covered in 2 weeks; mats white; tests for extracellular oxidase negative to positive with gallic and tannic acid agars, positive with guaiacum.

(1).2.3.7.(34).35.36.38.40.42.50.54.55.59. *Polyporus adustus* Willd. ex Fr. (Nobles 1948, 1958*a*)

Oidia formed by fragmentation of nodose-septate hyphae; radius up to 5.0 cm in 6 weeks; tests for extracellular oxidase consistently positive.

2.3.7.35.36.38.39.47.54.56. *Polyporus umbellatus* Pers. ex Fr. (Nobles 1948)

Key Code 2.3.8.

Fiber hyphae accompanied by nodose-septate hyphae with walls irregularly thickened (Figs. 13–16, 90, 92)..Key Code 2.3.8.9.

Fiber hyphae accompanied by cuticular cells closely packed to form skinlike areas (Figs. 48–55) ....Key Code 2.3.8.10.

Fiber hyphae accompanied by nodose-septate hyphae with numerous, short, interlocking branches or nodules forming skinlike areas (Figs. 56–63).........Key Code 2.3.8.11.

Fiber hyphae accompanied by cystidia on vegetative mycelium, capitate or cylindrical, incrusted (Figs. 17–23)..Key Code 2.3.8.13.

Fiber hyphae accompanied by gloeocystidia on vegetative mycelium (Fig. 40)............. ....Key Code 2.3.8.15.

Fiber hyphae accompanied by nodose-septate hyphae with noteworthy swellings........... ....Key Code 2.3.8.26.

Fiber hyphae present alone, unaccompanied by other special structures; conidia, chlamydospores, and oidia lacking.....................................Key Code 2.3.8.32.

Key Code 2.3.8. (*Concluded*)

Fiber hyphae present alone, unaccompanied by other special structures; conidia present; chlamydospores and oidia lacking.............................Key Code 2.3.8.33.

Fiber hyphae present alone, unaccompanied by other special structures; conidia lacking; chlamydospores present; oidia present or lacking.................Key Code 2.3.8.34.

Key Code 2.3.8.9.

Mats pink or vinaceous, cottony to cottony-floccose and pitted, with poroid fruiting areas over inoculum after 1 to 2 weeks, covering most of surface after 6 weeks, waxy, the dissepiments thick and pores small; chlamydospores rare, thin-walled, 10.5–24.0 × 6.0–7.5 μ; fiber hyphae occasionally branched; basidiospores cylindrical, 6.0–8.0 × 1.5–2.0 μ; associated with brown cubical rot of coniferous or, rarely, broad-leaved trees.

(1).2.3.8.9.34.36.38.43.44.48.50.(54).55.59. *Fomes cajanderi* Karst. (Nobles 1948, 1958*a*, as *Fomes subroseus* (Weir) Overh.)

Mats white, with zones of thin, woolly, appressed mycelium alternating with zones of raised woolly mycelium bearing fragile, poroid fruiting areas; hyphae with irregularly thickened walls numerous and conspicuous (omitted from 1948 description); chlamydospores lacking; fiber hyphae unbranched (Fig. 8); basidiospores allantoid, 4.0 × 1.5 μ; associated with brown stringy rot of coniferous trees.

2.3.8.9.32.36.38.47.48.53.55. *Polyporus amorphus* Fr. (Nobles 1948)

Key Code 2.3.8.10.

Conidia, chlamydospores, and oidia lacking.......................Key Code 2.3.8.10.32.

Conidia lacking; chlamydospores present; oidia lacking.............Key Code 2.3.8.10.34.

Conidia and chlamydospores lacking; oidia present................Key Code 2.3.8.10.35.

Key Code 2.3.8.10.32.

Mats at first translucent white, cottony or farinaceous, becoming in part opaque, felty or pellicular, buff or olive-buff, frequently wrinkled, these areas containing cuticular cells (Fig. 50); fiber hyphae numerous, frequently branched; staghorn hyphae present in some isolates; widely distributed on broad-leaved or, rarely, coniferous trees.

2.3.8.10.32.36.37.38.39.43.–47.54.(55).60. *Ganoderma applanatum* (Pers. ex Wallr.) Pat. (Nobles 1948)

Mats two-zoned, the outer zone composed of white, short, cottony mycelium, the inner zone of cream-buff to avellaneous, appressed, farinaceous to felty mycelium, becoming cartilaginous and furrowed; fiber hyphae numerous, hyaline to buffy-brown, frequently branched; staghorn hyphae numerous in some isolates, rare in others; on broad-leaved trees, occurring in Canada only in southernmost part of Ontario.

2.3.8.10.32.37.38.43.44.54. *Ganoderma lobatum* (Schw.) Atk. (Nobles 1948)

Mats white at first, becoming cream-buff to dull gold color, felty with farinaceous surface, wrinkled; fiber hyphae rare or apparently lacking (omitted from description in 1948); staghorn hyphae not observed; restricted to western coniferous trees.

2.3.8.10.32.36.37.39.40.43.50.55. *Ganoderma oregonense* Murr. (Nobles 1948)

Mats at first white, felty with farinaceous surface, developing more or less extensive greenish-yellow to brown areas with surface crustose or glazed, wrinkled and furrowed, these areas containing cuticular cells (Fig. 49); fiber hyphae numerous, frequently branched; staghorn hyphae present in some isolates, apparently lacking in others; restricted to eastern coniferous trees.

2.3.8.10.32.36.37.38.40.43.44.55. *Ganoderma tsugae* Murr. (Nobles 1948)

(See also *Ganoderma sessile* 2.3.8.10.34.36.37.38.40.42.48.54.60.)

Mats mainly white, thin-woolly, becoming felty to chamoislike, developing brown thonglike lines or small crustose areas containing cuticular cells and interlocking hyphae, very compactly arranged (Fig. 93); fiber hyphae numerous, hyaline or yellow, occasionally branched; widely distributed on broad-leaved or, rarely, coniferous trees.

2.3.8.10.(11).32.37.38.39.43.44.53.54.(55). *Daedalea confragosa* Bolt. ex Fr. (Nobles 1948)

Mats white at first, cottony, becoming cream to brown, appressed, felty to chamoislike, with some raised white woolly plateaus and compact lumps on surface and papillae against side wall; fiber hyphae numerous, hyaline to buffy-brown, occasionally branched; widely distributed on broad-leaved trees.

2.3.8.10.32.37.38.39.42.–44.54. *Fomes fomentarius* (L. ex Fr.) Kickx (Nobles 1948)

Key Code 2.3.8.10.34.

Mats white, cottony at first, becoming felty and irregularly thickened, usually corroded in appearance, fruiting in some isolates in organized poroid areas or in inconspicuous groups of basidia; fiber hyphae numerous, branched; chlamydospores numerous, globose to ovoid

Key Code 2.3.8.10.34. (*Concluded*)

with walls noticeably thick and often appearing sculptured, 10.5–16.5 × 7.5–12.0 μ; staghorn or coralloid hyphae present in some isolates; on broad-leaved trees, usually *Fraxinus* spp.

2.3.8.(10).34.36.38.43.44.(48).54.60. *Fomes fraxineus* (Bull. ex Fr.) Cooke (Nobles 1948)

Mats white or wood brown, at first slightly raised, cottony, then appressed, felty to pellicular with farinaceous surface, traversed by deep wrinkles or grooves; cuticular cells (Fig. 48) present; fiber hyphae numerous, frequently branched; chlamydospores numerous, with walls slightly thickened, broadly ovoid to elongate, 12.0–21.0 × 7.5–10.5 μ; staghorn hyphae present in some isolates; on broad-leaved trees.

2.3.8.10.34.36.37.38.40.42.(48).54.60. *Ganoderma sessile* Murr. (Nobles 1948, as *Ganoderma lucidum* (Leyss. ex Fr.) Karst.)

Key Code 2.3.8.10.35.

Cuticular cells (Fig. 51) present.

2.3.8.10.35.36.37.39.43.44.53.54. *Polyporus graveolens* (Schw.) Fr. (Nobles 1948)

Key Code 2.3.8.11.

Mats mottled, some areas white, woolly-felty, the remainder brown or vinaceous, felty to skinlike, brittle or cartilaginous, containing interlocking nodulose hyphae (Fig. 61); chlamydospores rare or apparently lacking, thin-walled, 9.0–13.4 × 6.0–7.5 μ; on broad-leaved trees.

2.3.8.11.32.34.37.38.40.42.50.54.60. *Polyporus arcularius* Batsch ex Fr. (Nobles 1948)

Mats mainly brown, skinlike and wrinkled, with some islands remaining white, cottony to woolly; chlamydospores rare or apparently lacking, thin-walled, 9.0–13.5 × 6.0–9.0 μ; usually on broad-leaved trees.

2.3.8.11.32.34.37.38.40.42.43.54.(55).60. *Polyporus brumalis* Pers. ex Fr. (Nobles 1948)

Mats mainly white, subfelty to felty, with smooth brown areas around the inoculum and in partial zones, cartilaginous or glazed, containing interlocking, nodulose hyphae (Fig. 63); fiber hyphae present (Fig. 11); chlamydospores lacking; not known to be associated with decay in trees, in nature growing from sclerotia.

2.3.8.11.32.37.39.44.–46.56.60. *Polyporus tuberaster* Jacq. ex Fr. (Nobles 1948)

(See also *Polyporus squamosus* 2.3.11.35.36.37.38.47.54.58.)

Mats mainly white, woolly, becoming felty to chamoislike, developing brown thonglike lines or small crustose areas containing both cuticular cells and interlocking hyphae, very compactly arranged (Fig. 93); chlamydospores lacking; widely distributed, usually on broad-leaved trees.

2.3.8.10.11.32.37.38.39.43.44.53.54.(55). *Daedalea confragosa* Bolt. ex Fr. (Nobles 1948)

Mats mainly white, cottony-woolly, tough and coherent, with small and scattered brown areas; chlamydospores lacking; on broad-leaved trees, usually *Alnus* spp.

2.3.8.11.32.36.37.38.43.–46.(48).50.54. *Fomes scutellatus* (Schw.) Cooke (Nobles 1948)

Mats mainly white, raised, cottony-woolly to felty, with small brown crustose areas, composed of interlocking hyphae, in some isolates (omitted from description in 1948); chlamydospores fairly numerous in some isolates, rare or apparently lacking in others, thin-walled, 10.7–15.6 × 4.6–7.8 μ; usually on broad-leaved trees, rarely on conifers.

2.3.8.11.32.34.36.37.40.42.(48).53.54.(55).60. *Polyporus versicolor* L. ex Fr. (Nobles 1948)

Key Code 2.3.8.13.

Cystidia capitate, incrusted (Figs. 21, 30); chlamydospores lacking; fiber hyphae numerous; mats white, raised, cottony, in some isolates bearing papillae covered with hymenium; on broad-leaved or, rarely, coniferous trees.

2.3.8.13.32.36.38.43.44.(48).54.(55).60. *Polyporus pargamenus* Fr. (Nobles 1948)

Cystidia capitate, incrusted (Fig. 22); chlamydospores lacking; fiber hyphae rare in most isolates; mats white, cottony-floccose to woolly, without fruiting; on coniferous or, rarely, broad-leaved trees.

2.3.8.13.32.36.38.43.44.(54).55.60. *Polyporus abietinus* Dicks. ex Fr. (Nobles 1948)

Cystidia cylindrical, partially incrusted (Fig. 17); chlamydospores numerous, 7.5–10.5 × 6.5–9.0 μ; fiber hyphae rare or apparently lacking; mats white, farinaceous to felty, with overgrowth of cottony brown mycelium; on coniferous trees.

2.3.8.13.34.36.37.39.47.50.53.55. *Echinodontium tinctorium* Ell. & Ev. (Nobles 1948)

Cystidia or cystidium-like ends on fiber hyphae thick-walled, pointed, with oil drops appearing to ooze from minute projections on walls (Fig. 19), becoming yellowish; chlamydospores lacking; conidia borne on oedocephaloid conidiophores, teardrop-shaped, thin-walled, hyaline at first, finally yellowish-brown, 5.0–10.0 × 2.5–5.6 μ; on coniferous trees.

2.3.8.13.33.36.38.39.47.55.59. *Stereum sulcatum* Burt (Maxwell 1954)

Key Code 2.3.8.15.

Gloeocystidia with yellowish, refractive contents usually present (Fig. 40) (omitted from description in 1948).

2.3.8.15.32.36.38.47.53.54.58. *Stereum murraii* (Berk. & Curt.) Burt (Nobles 1948)

Key Code 2.3.8.26.

Swellings occasional, terminal and intercalary, up to 12.0 μ diameter; fruiting within 6 weeks, the fruit body poroid, the basidia cruciately septate.

(1).2.3.(7).8.26.32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

Swellings numerous, 7.5–15.0 μ diameter, in moniliform arrangement, separated by minute clamp connections; no fruiting before the end of 6 weeks.

2.3.8.26.32.36.38.43.–46.53.55.60. *Polyporus volvatus* Peck (Nobles 1948)

Key Code 2.3.8.32.

Cultures of the 16 species that fall under Key Code 2.3.8.32. are so similar in macroscopic appearance and in microscopic characters that no precise criteria for separation are available. Usually identification can be made only by comparing the isolate to be identified with the whole complex of characters shown by each species. Hence detailed descriptions of the species, including all information that might be pertinent, are included in the key. Color in the mycelial mats, pink in those of *Fomes roseus*, and brown, often only in small areas, in those of *Fomes fomentarius*, *F. scutellatus*, *Polyporus anceps*, and *P. versicolor*, may aid in the identification of cultures of these species. Isolates of *P. hirsutus*, *P. pubescens*, *P. zonatus*, and those of *P. versicolor* that remain white can be identified with certainty only when fruit bodies are formed, from which single spore cultures can be isolated and paired with single spore isolates from fruit bodies collected in nature. Interfertility, indicated by the formation of nodose-septate hyphae, is accepted as proof of conspecificity. The dendritically branched fiber hyphae of *Polyporus anceps* and the nodose-septate fiber hyphae of *Cerrena unicolor* and *Lenzites betulina* are of diagnostic value. Aid in identifications may be provided by host relationships, including the preference of *Fomes scutellatus* for *Alnus* spp., of *Polyporus zonatus* for *Populus* spp., of *Fomes fraxinophilus* for *Fraxinus* spp., of *F. ellisianus* for *Shepherdia*, and of *Polyporus conchifer* for *Ulmus* spp.

Mats becoming pink to vinaceous; tests for extracellular oxidase negative to weakly positive with gallic and tannic acid agars, negative with guaiacum; associated with brown cubical rot of coniferous or, rarely, broad-leaved trees.

(1).2.3.8.32.36.38.39.43.48.54.55.59. *Fomes roseus* (Alb. & Schw. ex Fr.) Karst. (Nobles 1948, 1958*a*)

Mats white at first, cottony, becoming cream color to brown, appressed, felty to chamoislike, with some raised, white, woolly plateaus and compact lumps on surface and papillae against side walls; fiber hyphae numerous, hyaline to buff-brown, occasionally branched, usually mixed with cuticular cells (10) in skinlike areas; widely distributed on broad-leaved trees.

2.3.8.(10).32.37.38.39.42.–44.54. *Fomes fomentarius* (L. ex Fr.) Kickx (Nobles 1948)

Mats mainly white, cottony-woolly, tough and coherent, with small, scattered, brown areas in which interlocking hyphae (11) are usually present; fiber hyphae numerous, frequently branched, aseptate; occasionally fruiting, the hymenium covering granules on the surface of balls of cottony or felty mycelium; basidiospores cylindrical, 7.5–8.0 × 2.2–3.0 μ; on broad-leaved trees, usually *Alnus* spp.

2.3.8.(11).32.36.37.38.43.–46.(48).50.54. *Fomes scutellatus* (Schw.) Cooke (Nobles 1948)

Mats mainly white, at first woolly or woolly-floccose, becoming felty or chamoislike in irregular areas or incomplete zones, often punctate, with small, brown, skinlike areas in some isolates, composed of interlocking hyphae (11); fiber hyphae numerous, aseptate, frequently branched; chlamydospores fairly numerous to rare, thin-walled, 10.7–15.6 × 4.6–7.8 μ; network of narrow hyphae present; associated with white saprot in broad-leaved or, rarely, coniferous trees.

2.3.8.(11).32.(34).36.37.40.42.(48).53.54.(55).60. *Polyporus versicolor* L. ex Fr. (Nobles 1948)

Mats white, at first slightly raised, loosely arranged, cottony-woolly, becoming more compact, woolly to felty, frequently tufted or reticulate, after 2 to 3 weeks forming fruiting areas with the surface more or less waxy, covered with granules or incomplete to regular pores, on the inoculum, over small to extensive areas on the surface of the mat, or on the mycelium growing between the Petri dish and lid; fiber hyphae numerous, aseptate, some bearing numerous tapering branches along a short length and then resembling the "bovista" type of binding hyphae; network of narrow hyphae present; chlamydospores rare, thin-walled, 10.5–16.5 × 4.5–7.5 μ; widely distributed on broad-leaved or, rarely, coniferous trees.

2.3.8.32.34.36.38.42.43.(48).54.(55).60. *Polyporus hirsutus* Wulf. ex Fr. (Nobles 1948)

Key Code 2.3.8.32. (*Continued*)

Mats white, at first slightly raised, cottony or woolly, becoming appressed, felty, forming a coherent pellicle which may extend over the whole surface or may be limited to irregular zones, frequently growing up side of Petri dish and there forming spongy papillae or larger masses which may bear fertile hymenium without organized pores; fiber hyphae numerous, aseptate, occasionally with numerous tapering branches along a short length and then resembling the "bovista" type of binding hyphae; network of narrow hyphae present; no chlamydospores; widely distributed on broad-leaved trees.

2.3.8.32.36.38.40.42.43.(48).54.60. *Polyporus pubescens* Schum. ex Fr. (Nobles 1948)

Mats white, very slightly raised, at first woolly, then woolly-floccose and uniform in appearance, becoming woolly-felty and finally felty to pellicular, opaque, with surface appearing slightly rough, pebbled or pitted, usually uniform over whole colony but occasionally interrupted by irregular areas in which mycelium remains woolly and translucent; fiber hyphae numerous, aseptate, the tips occasionally expanded; network of narrow hyphae present; chlamydospores fairly numerous to rare, 11.2–21.0 × 4.6–8.4 μ; oidia observed in one isolate, formed by fragmentation of nodose-septate hyphae; on broad-leaved trees, especially *Populus* spp.

2.3.8.32.34.(35).36.40.42.43.54.60. *Polyporus zonatus* Fr. (Nobles 1948)

Mats white or with scattered brown dots or small areas, at first raised, cottony-woolly, spongy, becoming appressed, woolly, with opaque, felty-pellicular islands which may coalesce to form a continuous pellicle or remain discrete, the intervening areas being translucent, with more or less extensive fruiting areas after 4 to 6 weeks, consisting of small poroid areas over raised compact masses of mycelium on surface or against side wall, or more extensive zones covered with irregular pores or teeth; fiber hyphae aseptate, frequently branched, occasionally dendritically (Fig. 12); chlamydospores fairly numerous or apparently lacking, with walls slightly thickened, 9.3–14.0 × 4.6–6.2 μ; basidiospores cylindrical, 7.5–10.0 × 2.2–3.0 μ; associated with white pocket rot of coniferous trees.

2.3.8.32.34.36.38.42.–44.48.55.60. *Polyporus anceps* Peck (Nobles 1948)

Mats white, soon becoming felty or pellicular, tough and coherent, with areas of raised velvety overgrowth, frequently along narrow sectors, bearing poroid fruiting surfaces; fiber hyphae numerous, aseptate, frequently branched; chlamydospores restricted to submerged mycelium, rare to numerous, fairly thin-walled, 9.0–18.0 × 6.0–9.0 μ; basidiospores ovoid or truncate, with walls fairly thick and refractive, 6.0–7.5 × 4.5–6.0 μ; on broad-leaved trees, usually *Fraxinus* spp.

2.3.8.32.34.36.38.43.44.48.54.60. *Fomes fraxinophilus* (Peck) Cooke (Nobles 1948)

Mats white or with tinge of cream-buff, appressed, downy, becoming slightly more compact, woolly; fiber hyphae rare to fairly numerous, aseptate, branched; no chlamydospores; restricted to *Sheperdia*.

2.3.8.32.36.38.44.–46.54.60. *Fomes ellisianus* And. (Nobles 1948)

Mats white, at first raised, cottony-floccose, becoming collapsed in older part, cottony-woolly, with irregular thickenings giving lacunose appearance, growing to top of Petri dish and extending over inner surface of lid, remaining fragile and never tough; fiber hyphae numerous, "nodose-septate, the clamp connections far apart (200–600 μ), the walls thick and refractive, the lumina narrow or occluded and usually evident only at the clamp connections and at the tips" (van der Westhuizen 1963); no chlamydospores; on broad-leaved or, rarely, coniferous trees.

2.3.8.32.36.38.40.42.43.53.54.(55).59. *Cerrena unicolor* (Bull. ex Fr.) Murr. (Nobles 1948, as *Daedalea unicolor* Bull. ex Fr.; van der Westhuizen 1963)

Mats white, at first slightly raised, floccose-woolly, becoming patchy, with some raised, felty-woolly plateaus, very tough, the intervening areas appressed, felty, all peeling readily from the agar, the mycelium frequently growing up sides of Petri dish and down between lid and base; fiber hyphae numerous, nodose-septate on basal portions, with long aseptate terminal cells, and with occasional expansions, terminal and intercalary; no chlamydospores; on broad-leaved trees and, rarely, coniferous trees.

2.3.8.32.36.38.42.–44.54.(55).60. *Lenzites betulina* (L. ex Fr.) Fr. (Nobles 1948)

Mats white, uniform, appressed, subfelty to floccose or somewhat tufted except in parts remote from inoculum where it is raised, woolly, growing up side of Petri dish; fiber hyphae numerous, branched; no chlamydospores; on broad-leaved trees, usually *Ulmus* spp.

2.3.8.32.36.38.40.42.43.54. *Polyporus conchifer* (Schw.) Fr. (Nobles 1948)

Mats white, at first slightly raised, woolly, later raised, uniformly cottony-woolly to felty over the whole surface, sometimes growing up wall of Petri dish to top; fiber hyphae numerous, aseptate, rarely branched; no chlamydospores; network of narrow hyphae; on coniferous and broad-leaved trees.

2.3.8.32.36.38.40.42.43.54.55. *Poria subacida* (Peck) Sacc. (Nobles 1948)

Mats white, appressed, woolly or subfelty; fiber hyphae numerous, branched, aseptate; no chlamydospores; on broad-leaved trees.

2.3.8.32.36.38.40.46.54.60. *Favolus alveolaris* (DC. ex Fr.) Quél. (Nobles 1948)

Key Code 2.3.8.32. (*Concluded*)

Mats white, slightly raised, cottony in newest growth, then collapsed, woolly-felty, with slightly raised tufts arranged in more or less concentric zones and with small masses of compactly arranged mycelium around edge of Petri dish in some isolates, from which develop abortive or, occasionally, mature but distorted lamellate fruit bodies; fiber hyphae numerous, aseptate, frequently branched; no chlamydospores; on broad-leaved or, rarely, coniferous trees.

2.3.8.32.36.38.40.43.(48).54.(55).60. *Pleurotus ostreatus* (Jacq. ex Fr.) Kummer (Nobles 1948)

Mats white, thin, felty, bearing poroid fruit bodies, the basidia cruciately septate; some hyphae with thick walls may be interpreted as fiber hyphae; on broad-leaved and coniferous trees.

(1).2.3.(7).8.(26).32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

(See also *Stereum murraii* under Key Code 2.3.8.15.)

Key Code 2.3.8.33.

2.3.8.(13).33.36.38.39.47.55.59. *Stereum sulcatum* Burt (Maxwell 1954)

Key Code 2.3.8.34.

Mats orange-colored or cinnabar red in some areas, patchy, somewhat zonate, mainly white, downy or woolly and translucent, or pellicular and opaque, with color limited to granules over the oldest part or to small islands or, more rarely, large irregular areas or more or less complete zones of somewhat raised, felty, woolly, or woolly-felty mycelium, in shades of orange; oidia numerous in most isolates, formed by fragmentation of nodose-septate hyphae; chlamydospores rare to fairly numerous, thin-walled, 7.2–13.5 × 5.2–9.8 µ; basidiospores cylindrical, 4.6–5.9 × 2.0–2.6 µ, mainly narrower than those of related species; on broad-leaved or, rarely, coniferous trees, widely distributed in North Temperate Zone.

2.3.8.34.35.36.37.38.40.43.–45.48.54.(55).60. *Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (Nobles 1948, as *Polyporus cinnabarinus* Jacq. ex Fr.; Nobles and Frew 1962)

Mats orange-colored or cinnabar red in some areas, patchy, some areas downy to floccose, translucent, some incomplete zones or sectors opaque white, pellicular, some raised, woolly to woolly-floccose, white or colored in shades of pink, with scattered granules, ridges or pores of reddish-orange over opaque white areas; oidia numerous in most isolates, formed by fragmentation of nodose-septate hyphae; chlamydospores rare to fairly numerous, thin-walled, 9.2–19.5 × 4.6–9.5 µ; basidiospores 4.0–4.6 × 1.6–2.0 µ; on broad-leaved and coniferous trees in islands of the Pacific and Indian Oceans and countries bordering on these waters.

2.3.8.34.35.36.37.38.40.43.48.54.55.60. *Pycnoporus coccineus* (Fr.) Bond. & Sing. (Nobles and Frew 1962)

Mats orange-colored or cinnabar red in some areas, patchy, with some areas translucent-white, downy or woolly, other sectors or areas opaque, white, felty or pellicular, often bearing vivid orange granules, other areas raised, woolly-floccose or woolly-cottony, often colored in shades of pink or orange, with or without vivid orange granules, teeth, or pores; oidia numerous, formed by fragmentation of nodose-septate hyphae; chlamydospores numerous in most isolates, thin-walled, 6.3–11.9 × 4.9–8.4 µ; basidiospores 3.6–5.2 × 2.0–2.6 µ; on broad-leaved or, rarely, coniferous trees in tropical and subtropical regions.

2.3.8.34.35.36.37.38.43.44.48.54.(55).60. *Pycnoporus sanguineus* (L. ex Fr.) Murr. (Nobles and Frew 1962)

Mats white or pale pinkish-cinnamon; chlamydospores very numerous, making up most of mounts from vegetative mycelium and fruiting areas, with walls slightly thickened, 7.5–13.5 × 6.0–12.0 µ; basidiospores broadly ovoid, 5.4 × 3.6 µ; on broad-leaved or, rarely, coniferous trees.

2.3.8.34.36.38.42.48.54.(55). *Polyporus biennis* (Bull. ex Fr.) Fr. (Nobles 1948, as *Polyporus distortus* (Schw.) Fr.)

Mats white or with tinges of yellow; chlamydospores very numerous, making up most of mounts from vegetative mycelium and fruiting areas, with walls fairly thick, 8.0–13.5 × 6.0–9.0 µ; basidiospores ovoid, truncate, 6.0–9.0 × 4.5–6.0 µ; on broad-leaved trees, usually *Quercus* spp.

2.3.8.34.36.38.42.43.48.50.54.60. *Polyporus compactus* Overh. (Nobles 1948)

Mats white or with tinges of chamois or yellow; chlamydospores few to abundant, with walls slightly thickened, 10.5–22.0 × 9.0–16.5 µ; basidiospores broadly ovoid, frequently with conspicuous oil drop, 4.5–6.3 × 3.6–4.5 µ; on broad-leaved trees.

2.3.8.34.36.38.39.43.–46.(48).53.54.56. *Polyporus frondosus* Dicks. ex Fr. (Nobles 1948)

Key Code 2.3.8.34. (*Concluded*)

Mats white; chlamydospores numerous, thin-walled, 6.0–13.5 × 6.0–9.0 μ; basidiospores broadly ellipsoid, 5.0–7.0 × 4.0–5.0 μ; on broad-leaved trees, usually *Quercus* spp.

2.3.8.34.36.38.46.48.53.54.60. *Polyporus obtusus* Berk. (Nobles 1948)

Mats white; chlamydospores numerous, with walls noticeably thickened and often appearing sculptured, 10.5–16.5 × 7.5–12.0 μ; basidiospores subglobose or broadly ovoid, with conspicuous oil drop, 5.4–6.0 μ diameter, observed in large numbers in old cultures, apparently empty; on broad-leaved trees, especially *Fraxinus* spp.

2.3.8.(10).34.36.38.43.44.(48).54.60. *Fomes fraxineus* (Bull. ex Fr.) Cooke (Nobles 1948)

Mats white; chlamydospores rare to numerous, thin-walled, 7.5–15.0 × 4.5–6.0 μ; odor noticeably strong, sweet; on *Salix* spp. and, occasionally, *Populus* spp.

2.3.8.34.36.40.42.43.50.54.60. *Trametes suaveolens* (L. ex Fr.) Fr. (Nobles 1948)

Mats white or with small brown areas; chlamydospores rare or apparently lacking. (See Key Code 2.3.8.32. for descriptions)

2.3.8.(11).32.34.36.37.40.42.(48).53.54.(55).60. *Polyporus versicolor* L. ex Fr. (Nobles 1948)

2.3.8.32.34.36.38.42.43.(48).54.(55).60. *Polyporus hirsutus* Wulf. ex Fr. (Nobles 1948)

2.3.8.32.34.35.36.40.42.43.54.60. *Polyporus zonatus* Fr. (Nobles 1948)

2.3.8.32.34.36.38.42.–44.48.55.60. *Polyporus anceps* Peck (Nobles 1948)

2.3.8.32.34.36.38.43.44.48.54.60. *Fomes fraxinophilus* (Peck) Cooke (Nobles 1948)

Key Code 2.3.9.

Plates not covered in 6 weeks, the radius 4.5 cm or less; chlamydospores lacking; contorted incrusted hyphal tips numerous (Figs. 43,91); some hyphae with walls irregularly thickened or with refractive areas on walls (Fig. 90) usually present (omitted from description in 1948); no fruit bodies produced before the end of 6 weeks; on broad-leaved or, rarely, coniferous trees.

2.3.9.12.32.36.38.39.47.(48).54.55. *Polyporus semipileatus* Peck (Nobles 1948)

Plates covered in 3 weeks; chlamydospores fairly numerous, thin-walled, 6.0–12.0 × 4.5–7.5 μ; contorted incrusted hyphal tips numerous (Fig. 44); waxy, poroid fruiting surfaces on raised cottony balls of mycelium usually present after 4 to 5 weeks; cystidia lacking; basidiospores allantoid, 3.0–4.0 × 1.5 μ; some hyphae with walls irregularly thickened or with refractive areas on walls usually present (omitted from description in 1948); on broad-leaved trees.

2.3.9.12.34.36.38.43.48.53.54.60. *Polyporus albellus* Peck (Nobles 1948)

Plates covered in 4 to 6 weeks; chlamydospores numerous, thick-walled, 12.0–21.0 × 6.0–16.5 μ; contorted incrusted hyphal tips numerous (Fig. 42); some hyphae with walls irregularly thickened or with refractive areas on walls usually present (omitted from description in 1948); fruiting usually after 4 to 6 weeks, with foliose or large-pored fruit bodies on raised lumps of mycelium; cystidia fairly numerous in the hymenium, ventricose, incrusted at tip, 22.0–34.0 × 6.0–7.5 μ (Fig. 29); basidiospores ovoid, 4.5–7.0 × 3.5–4.5 μ; on coniferous trees.

2.3.9.12.14.34.36.38.44.–46.(48).55.60. *Polyporus borealis* Fr. (Nobles 1948)

Key Code 2.3.10.

2.3.(8).10.32.36.37.39.40.43.50.55. *Ganoderma oregonense* Murr. (Nobles 1948)

Key Code 2.3.11.

Oidia numerous, formed by fragmentation of nodose-septate hyphae; mats mainly white but usually with some brown skinlike areas composed of brown, nodulose, interlocking hyphae (Fig. 62), thus resembling cultures of species of *Polyporus sensu stricto*, treated under Key Code 2.3.8.11.

2.3.11.35.36.37.38.47.54.58. *Polyporus squamosus* Huds. ex Fr. (Nobles 1948)

Oidia lacking; mats white at first and remaining so or becoming buff to brown in small areas next wall of Petri plate or in lines traversing the mat; reverse with conspicuous thonglike strands of compact mycelium grown from surface down through the agar.

2.3.(7).11.32.36.37.38.44.45.53.54.55.56. *Collybia radicata* (Fr.) Quél. (Nobles 1948)

Oidia lacking; mats white at first, developing sharply contrasting areas or zones, brown and crustose, composed of interlocking hyphae (Fig. 60), from which arise numerous "aerial rhizomorphs", concolorous with the crustose surface, extending into the air or meeting surface of agar in advance of mat proper and there forming a brown velvety mycelium followed by a mat typical of a new colony.

2.3.11.16.26.32.37.38.47.55.60. *Xeromphalina campanella* (Fr.) Kuhner & Maire (Nobles 1948, as *Omphalia campanella* Fr.)

Key Code 2.3.12.
(See Key Code 2.3.9. for key)
2.3.(9).12.32.36.38.39.47.(48).54.55. *Polyporus semipileatus* Peck (Nobles 1948)
2.3.(9).12.34.36.38.43.48.53.54.60. *Polyporus albellus* Peck (Nobles 1948)
2.3.(9).12.14.34.36.38.44.–46.48.55.60. *Polyporus borealis* Fr. (Nobles 1948)

Key Code 2.3.13.
Cystidia capitate, incrusted (Fig. 23); mats white.
2.3.13.32.(35).36.40.43.–46.54.55.58. *Odontia bicolor* (Alb. & Schw. ex Fr.) Bres. (Nobles 1953)
Cystidia cylindrical, partially incrusted (Fig. 17); mats brown, at least in part.
2.3.(8).13.34.36.37.39.47.50.53.55. *Echinodontium tinctorium* Ell. & Ev. (Nobles 1948)

Key Code 2.3.14.15.
Conidia, chlamydospores, and oidia lacking......................Key Code 2.3.14.15.32.
Conidia present; chlamydospores and oidia lacking...............Key Code 2.3.14.15.33.

Key Code 2.3.14.15.32.

The species in this group resemble one another in cultural characters as well as in those characters of their fruit bodies that are the basis for the segregation of the genus *Peniophora sensu stricto*. They grow rapidly, the plates being covered in 2 to 3 weeks; their mats are mostly white although brown color may appear in scattered dots or on the mycelium against the wall of the Petri plate; the mats are mostly appressed, the surface layers so tough or rubbery that it is difficult to remove portions for microscopic examination, but with some overgrowth of compact granules or cottony mycelium; the agar appears patchy or mottled, with some areas brown, some unchanged in color, some bleached. In most species gloeocystidia, which become black in sulfuric benzaldehyde (Boidin 1951) occur on the vegetative mycelium or in fruiting areas, and in cultures that fruit cystidia are present in the hymenium. In most isolates narrow, staghorn-branched hyphae are closely interwoven, contributing to the characteristic toughness of the mats.

Because of the similarities among isolates of the different species and the variability in isolates of each species, specific identification is difficult. In an earlier paper (Nobles 1956), I assigned to *Stereum pini* (Schleich. ex Fr.) Fr. (=*Peniophora pini* (Schleich. ex Fr.) Boidin) the numerous isolates from decays in *Pinus* spp. in Canada. Later Weresub and Gibson (1960) showed that the "*Stereum pini*" of North America is not conspecific with *Peniophora pini* of Europe but is a species which they described under the name *Peniophora pseudopini* Weresub & Gibson. In Canada this is an important cause of decay in pine although *P. duplex* is also associated with decay in pine, while *Peniophora septentrionalis* Laurila is the common species on spruce.

Peniophora piceae (Pers.) Eriksson, whose cultural characters I described under the name *P. separans* Burt, a name since reduced to synonymy under *P. piceae* by Boidin and des Pomeys (1961), appears to belong to this group although clamp connections and simple septa both occur in the hyphae, and gloeocystidia and cystidia have not been observed in cultures. It is included under the Key Code 2.3.7.32. and Key Code 2.5.

Gloeocystidia numerous on vegetative mycelium and in fruiting areas, terminal or formed as a lateral swelling from an intercalary cell, with yellowish oily inclusions, positive with sulfuric benzaldehyde, variable in size and shape (Figs. 38, 39); cystidia restricted to fruiting areas, numerous, clavate or conical, the basal portion occasionally brown, incrusted with fine to coarse crystals, 23.0–62.0 × 6.2–12.4 μ (Fig. 27); distinctive narrow hyphae, with pronglike branches which often arise from slight bulbous swellings and whose tips are coiled to form masses in which the hyphal walls are no longer distinct, especially numerous in young growth; basidiospores 6.3–8.4 × 2.1–2.8 μ, in general appearing broader than those of *Peniophora pseudopini*; odor lacking or slightly sweet; common on *Picea* spp., rare on other coniferous trees.
2.3.14.15.32.36.37.38.40.43.(48).55.60. *Peniophora septentrionalis* Laurila (Nobles 1956)
Gloeocystidia numerous on vegetative mycelium and in fruiting areas, varying in shape from narrow, hypha-like to clavate or irregular, frequently with lateral swelling which causes the gloeocystidium to become curved or boomerang-shaped, often with yellow oily contents, negative or positive with sulfuric benzaldehyde (Figs. 36,37); cystidia restricted to fruiting areas, cylindrical with apex rounded or pointed, frequently contorted at base, incrusted over apical portion, 31.0–50.0(–70.0) × 6.2–12.4 μ (Fig. 26); distinctive hyphae with walls thin or thickened, surrounded by gelatinous sheath; basidiospores 6.3–8.4 × 2.1 μ, appearing narrower than those of *Peniophora septentrionalis*; odor usually strong, suggesting dried cocoanut; common on *Pinus* spp., rare on other coniferous trees, in North America.

Key Code 2.3.14.15.32. (*Concluded*)

2.3.14.15.32.36.37.38.39.42.43.48.53.55.60. *Peniophora pseudopini* Weresub & Gibson (Nobles 1956, as *Stereum pini* (Schleich. ex Fr.) Fr.; Weresub and Gibson 1960; McLain and Weresub 1962)

Gloeocystidia numerous to infrequent on vegetative mycelium, usually abundant in fruiting areas (Fig. 33), variable in shape, elongate but rarely narrow as in *Peniophora pseudopini*, irregular, spathulate, or, in fruit bodies, vesiculose to globoid, positive or negative with sulfuric benzaldehyde; cystidia restricted to fruiting areas, abundant to rare, "the full length as much as 35 μ; apex a crystal-encrusted cap, 7–12 × 5–7 μ" (Weresub and Gibson 1960); distinctive hyphae with thickened walls gelatinizing into a thick outer sheath, becoming cemented into strands to a certain degree, these forming an indistinct branching and anastomosing network; basidiospores "straight to almost reniform, 6.5–8.8 × 2–3 μ" (Weresub and Gibson 1960); odor faint, suggesting spearmint; on *Pinus* spp. or, rarely, other coniferous hosts, in Europe.

2.3.14.15.32.36.38.43.(48).53.55.60. *Peniophora pini* (Schleich. ex Fr.) Boidin (Weresub and Gibson 1960, as *Peniophora pini* (Schleich. ex Fr.) Boidin subsp. *pini*; McLain and Weresub 1962)

Gloeocystidia lacking to infrequent in vegetative mycelium and fruiting areas, observed only after prolonged staining, usually long and flexuous, negative or, rarely, positive in sulfuric benzaldehyde (Fig. 32); cystidia restricted to fruit body, numerous to rare or apparently lacking, incrusted over terminal portion, the incrusted portion 23.0–46.8 × 6.2–19.0 μ (Fig. 24); distinctive hyphae narrow, with numerous tapering branches in dendritic arrangement, tightly meshed to form tough surface layer; hyphae with walls somewhat thickened and gelatinously modified; basidiospores from carpophores collected in nature (5–)6–7.8(–9) × (1.7–)2.2–2.8(–3.3) μ (Weresub and Gibson 1960); odor lacking; on *Pinus* spp., associated with saprot.

2.3.14.15.16.32.36.37.38.39.42.43.(48).55.60. *Peniophora duplex* Burt (Nobles 1956, as Fungus T; Weresub and Gibson 1960, as *Peniophora pini* (Schleich. ex Fr.) Boidin subsp. *duplex* (Burt) Weresub & Gibson; McLain and Weresub 1962)

Gloeocystidia numerous in fruit bodies (Fig. 35), found on vegetative mycelium (Fig. 34) only in cultures 6 weeks or more old, variable in shape, most frequently occurring as short to long lateral swellings with deeply staining, oily contents; cystidia restricted to fruiting areas, fairly numerous, most frequently with walls relatively thin, lumen staining, lightly incrusted, more rarely with walls thick and brown, the lumen narrow, 24.0–49.0 × 6.3–9.8 μ (Fig. 25); distinctive knots of hyphae formed from terminal or lateral swellings up to 11.0 μ diameter, often with oily or granular inclusions, bearing numerous short branches, radiating or coiled (22; Fig. 70); basidiospores short-cylindrical, 6.3–7.0 × 2.8 μ; odor strong, of iodoform; on coniferous trees.

2.3.14.15.22.32.36.37.38.43.(48).52.55.60. *Peniophora pithya* (Pers.) Eriksson (Nobles 1956)

Key Code 2.3.14.15.33.

Cystidia (Fig. 28) and gloeocystidia (Fig. 41) present in hymenium.

2.3.(7).14.15.33.36.38.40.43.44.48.54.59. *Peniophora heterocystidia* Burt (McKeen 1952)

Key Code 2.3.16.

2.3.11.16.26.32.37.38.47.55.60. *Xeromphalina campanella* (Fr.) Kuhner & Maire (Nobles 1948, as *Omphalia campanella* Fr.)

Key Code 2.3.20.

Distinctive hyphae with minute projections on walls (Fig. 47).

(1).2.3.(7).20.32.(34).36.38.43.48.54.55.60. *Schizophyllum commune* Fr. (Nobles 1948, 1958*a*)

Key Code 2.3.23.

(1).2.3.(7).23.33.36.38.45.46.54.55. *Trechispora raduloides* (Karst.) Rogers (Maxwell 1954; Nobles 1958*a*)

Key Code 2.3.26.

Allocysts numerous and conspicuous, usually terminal, occasionally intercalary, subglobose to ovoid or pyriform, 6.3–8.8 × 11.3–20.0 μ (Fig. 94); no odor; plates covered in 3 to 4 weeks; not known to occur in Canada.

2.3.26.32.36.38.43.44.54.55.60. *Flammula conissans* (Fr.) Gill. (Denyer 1960)

Allocysts as above; odor strong, musty; growth very slow, radius up to 6.5 cm in 6 weeks; widely distributed on coniferous and broad-leaved trees in Canada.

2.3.26.32.36.38.47.51.54.55.60. *Flammula alnicola* (Fr.) Kummer (Denyer 1960)

Key Code 2.3.26. (*Concluded*)

Lactiferous cells (26) occasionally present; oidia present, formed by fragmentation of simple-septate branches from nodose-septate hyphae; odor strong, of iodoform; on broad-leaved trees.

(1).2.3.(7).26.35.36.37.38.43.52.54.60. *Collybia velutipes* (Curt. ex Fr.) Kummer (Nobles 1948, 1958*a*)

Swellings numerous, 7.5–15.0 μ diameter, in moniliform arrangement, separated by minute clamp connections; no fruiting before the end of 6 weeks; on coniferous trees.

2.3.(8).26.32.36.38.43.–46.53.55.60. *Polyporus volvatus* Peck (Nobles 1948)

Occasional swellings up to 15.0 μ diameter (omitted from description in 1948); chlamydospores numerous, with walls somewhat thickened, 7.5–13.5 × 4.5–9.0 μ; fruiting within 6 weeks, the fruit body poroid, the basidia non-septate; on broad-leaved trees.

(1).2.3.(7).26.34.36.38.43.44.48.53.54.60. *Polyporus fumosus* Pers. ex Fr. (Nobles 1948, 1958*a*)

Occasional swellings, up to 12.0 μ diameter, on hyphae; no chlamydospores; fruiting before the end of 6 weeks, the fruit body poroid, the basidia cruciately septate; on broad-leaved and coniferous trees.

(1).2.3.(7).(8).26.32.36.38.44.–47.48.50.54.55.59. *Aporpium caryae* (Schw.) Teixeira & Rogers (Macrae 1955)

Key Code 2.4.

Mats at first all downy, later patchy, with some woolly areas; chlamydospores numerous even near margin, with walls slightly thickened, globose to ovoid, 6.0–12.0 μ diameter; broad simple-septate hyphae of the advancing zone at first thin-walled, becoming conspicuously thick-walled (Fig. 4); no odor; on broad-leaved trees.

2.4.7.34.36.38.40.42.(48).54.59. *Polyporus galactinus* Berk. (Nobles 1948)

Mats appressed, farinaceous, woolly, or subfelty, with scattered dots or larger irregular areas in which the mycelium is more or less raised, cottony-woolly, giving patchy appearance; hyphae simple-septate in advancing zone, giving off nodose-septate branches (Fig. 5); chlamydospores rare to fairly numerous, thin-walled, with walls slightly thickened, ovoid, 16.0–24.0 × 9.0–16.5μ; in crustose areas, hyphae irregular, with pegs, processes, and clavate tips, greenish to brown, embedded in brownish matrix, so agglutinated that detailed observation is difficult; lactiferous cells numerous in some isolates, apparently lacking in others, large, irregular in shape, staining deeply, conspicuous (Fig. 73); odor strong, sweet; on broad-leaved and coniferous trees.

2.4.(7).(26).32.34.36.37.38.40.42.50.54.55.59. *Polyporus resinosus* Schrad. ex Fr. (Nobles 1948)

Mats at first appressed, downy and translucent, becoming opaque in characteristic wedge-shaped areas, broadest toward the inoculum, where the submerged mycelium is densely arranged and the surface is woolly or floccose, and in some isolates developing after 5 or 6 weeks an overgrowth of slightly raised woolly or cottony mycelium beginning at edge and extending inward over mat; reverse showing conspicuous opaque wedge-shaped areas; chlamydospores usually numerous, globose and subglobose, 7.5–10.5 μ diameter; oidia rare in some isolates, apparently lacking in others, formed in advancing zone by fragmentation of broader hyphae with simple septa, 4.5–6.0 μ diameter, of varying lengths; broad, simple-septate hyphae of the advancing zone frequently developing thick, gelatinously modified walls; no odor; associated with white laminate rot of western coniferous and, presumably, broad-leaved trees.

2.4.7.34.35.36.38.40.41.42.(54).55.59. *Poria albipellucida* Baxter (Nobles 1948)

Mats at first appressed and filmlike, becoming woolly to minutely floccose, with some suggestion of radiating growth lines, all thin and translucent, usually with raised cottony-floccose mycelium against wall of Petri dish after 2 or more weeks, bearing scattered, raised, compact balls or tufts, whose surfaces may become poroid; chlamydospores numerous, becoming thick-walled, globose or broadly ovoid, 6.0–13.5 μ diameter; no oidia; broad simple-septate hyphae of the advancing zone frequentl ydeveloping thick, gelatinously, modified walls; no odor; on broad-leaved and coniferous trees (has not been encountered among isolates from decay).

2.4.7.34.36.38.40.41.42.(48).54.55.59. *Poria cinerascens* Bres. (Nobles 1948)

Key Code 2.5.

Hyphae of the advancing zone usually simple-septate but with occasional large, conspicuous, single, double, or multiple clamp connections on broader hyphae (Fig. 6); cystidiumlike structures, probably analogous to conducting cells of fruit bodies, being expanded ends of hyphae, with walls thickened and refractive, contents at first hyaline and staining in phloxine, then dark brown, plentiful in some isolates, rare or apparently lacking in others (Fig. 18); resinous masses on walls of some hyphae (Fig. 46).

2.5.(7).(13).(21).32.36.38.43.–45.55.57. *Stereum sanguinolentum* (Alb. & Schw. ex Fr.) Fr. (Nobles 1948)

Key Code 2.5. (*Concluded*)

Hyphae of the advancing zone all simple-septate or with rare single or multiple clamp connections, often difficult to find (Fig. 7); oidia numerous (Fig. 65).

(1).2.5.(6).7.35.36.38.42.43.53.55. *Peniophora gigantea* (Fr.) Massee (Nobles 1948, 1958*a*)

Hyphae with variable septation, with clamp connections rare to numerous, simple septa rare to numerous; network of narrow hyphae present.

2.(3).5.7.32.36.39.40.43.(48).55.60. *Peniophora piceae* (Pers.) Eriksson (Nobles 1956, as *Peniophora separans* Burt)

Hyphae of the advancing zone all simple-septate or with very rare single clamp connections, usually difficult to find; conidia on oedocephaloid conidiophores numerous (Fig. 81).

2.5.(6).7.(10).(11).33.36.(37).38.42.(47).50.53.(54).55. *Fomes annosus* (Fr.) Karst. (Nobles 1948)

Hyphae of the advancing zone all simple-septate or with very rare single clamp connections, usually difficult to find; mats brown; skinlike areas composed of cuticular cells (10) usually present (omitted from description in 1948); setae usually present.

2.5.(6).10.17.32.37.39.44.–47.(48).54. *Polyporus cuticularis* Bull. ex Fr. (Nobles 1948)

Hyphae of the advancing zone all simple-septate or with very rare single clamp connections, usually difficult to find; mats brown; skinlike areas composed of interlocking hyphae (11) present in some isolates; setae in fruiting areas numerous (Fig. 74).

2.5.(6).(7).(11).(17).32.36.37.38.39.43.44.(48).54.(55). *Polyporus gilvus* (Schw.) Fr. (Nobles 1948)

Key Code 2.6.

Hyphae remaining hyaline and mats white............................Key Code 2.6.36.

Hyphae and mats brown, at least in part.............................Key Code 2.6.37.

Key Code 2.6.36.

Fiber hyphae numerous, interwoven to form a pellicle; conidia numerous on young mycelium, borne on conidiophores up to 15.0 μ diameter, each bearing 1 to 20 or more sterigmatoid projections along sides or over apical portions, the conidia amyloid, globose, echinulate, 6.0–7.5 μ diameter (Fig. 82); chlamydospores present in submerged mycelium, thin-walled, ovoid, 12.0–16.5 × 7.5–12.0 μ; on coniferous and broad-leaved trees, especially *Quercus* spp. (The spores listed as conidia are identical in appearance with basidiospores of the species and may be so interpreted. Hence the symbol for fruit body production, 48, is included in the Species Code.)

2.6.8.33.34.36.38.45.48.53.54.55. *Polyporus berkeleyi* Fr. (Nobles 1948)

Fiber hyphae present; conidia and oidia lacking; chlamydospores rare or apparently lacking, with walls slightly thickened, 9.0–13.5 × 7.5–10.5 μ; on western coniferous trees.

2.6.8.32.34.36.38.45.46.55.56. *Polyporus montanus* (Quél.) Ferry (Nobles 1948)

Fiber hyphae numerous in some isolates, rare or apparently lacking in others; hyphae simple-septate (Fig. 3); conidia, chlamydospores, and oidia lacking; poroid fruiting areas, with typical cystidia in the hymenium, occasionally present; on broad-leaved trees.

(1).2.6.7.8.14.32.36.40.42.43.(48).53.54. *Polyporus tulipiferae* (Schw.) Overh. (Nobles 1948, 1958*a*)

Fiber hyphae rare or apparently lacking; conidia, chlamydospores, and oidia lacking; on broad-leaved trees, especially *Acer* spp.

2.6.7.8.32.36.38.47.54. *Fomes connatus* (Weinm.) Gill. (Nobles 1948)

Fiber hyphae lacking; conidia numerous, borne on oedocephaloid conidiophores, the conidia non-amyloid, subglobose to ovoid, 4.5–7.5 × 3.0–6.0 μ (Fig. 81); brown cuticular cells and interlocking hyphae, compactly arranged to form crustose areas, present in some isolates, lacking in others; on coniferous or, rarely, broad-leaved trees.

2.(5).6.7.(10).(11).33.36.37.38.42.(47).50.53.(54).55. *Fomes annosus* (Fr.) Karst. (Nobles 1948)

Fiber hyphae lacking; conidia and chlamydospores lacking; oidia numerous (Fig. 65); on coniferous trees.

(1).2.(5).6.7.35.36.38.42.43.53.55. *Peniophora gigantea* (Fr.) Massee (Nobles 1948, 1958*a*)

(See also *Hymenochaete corrugata* 2.6.7.11.32.36.37.38.39.42.43.50.54.(55).
Polyporus gilvus 2.(5).6.7.(11).17.32.36.37.38.39.43.44.(48).54.55.)

Key Code 2.6.37.

Cultures of Hymenomycetes with simple-septate brown hyphae and brown mats are difficult to identify. This difficulty arises from the extreme variability shown by the different isolates of one species, by one isolate in successive plantings, and even by different sectors of one colony. For example, some isolates of a species may show cuticular cells in abundance, forming conspicuous crustose areas, while other isolates may lack them completely. Some of the variability may be a response to the conditions under which the cultures are grown rather

Key Code 2.6.37. (*Concluded*)
than an expression of genetic differences. Thus when periods of high temperatures occur, some species tend to grow more slowly and produce crustose areas, composed of cuticular cells or interlocking hyphae, which are absent when conditions favor more rapid growth. This erratic occurrence of structures is indicated in the Species Code by bracketing the digits symbolizing the structures, as (10), (17), and so on. The number of symbols in parentheses attests to the extreme variability of the populations of the different species.

The key for this group is admittedly unsatisfactory, consisting as it does of abbreviated descriptions, in which all characters which might conceivably contribute to diagnosis are included. More precise descriptions of the cultural characters of the species, based on the examination of a number of isolates of each species, grown under controlled temperature conditions, are required for the preparation of a satisfactory key.

Growth rapid, plates covered in 1 to 3 weeks....................Key Code 2.6.37.41.–43.
Growth slower, plates covered in 4 to 6 weeks..................Key Code 2.6.37.44.–46.
Growth very slow, plates not covered in 6 weeks....................Key Code 2.6.37.47.

Key Code 2.6.37.41.–43.

Setal hyphae numerous; setae lacking; mats white at first, changing to buff, vinaceous, or tawny olive throughout or in certain zones, slightly raised, cottony in newest growth, becoming somewhat flattened, woolly, or crustose in small areas in some isolates; odor strong and unpleasant at first, then disappearing; associated with yellow ring rot in western coniferous trees.

2.6.18.32.37.38.40.43.44.53.55. *Poria weirii* Murr. (Mounce, Bier, and Nobles 1940; Nobles 1948)

Setal hyphae lacking; setae numerous in fruiting areas, 20.0–33.0 × 4.5–7.0 μ (Fig. 74); interlocking hyphae present in some isolates, forming skinlike areas; mats mainly white, slightly raised, cottony, with inoculum and some areas along radiating lines becoming brown, compact, felty to velvety, covered with poroid fruiting surface after 3 or more weeks in some isolates; basidiospores hyaline, oblong-ellipsoid, 4.0–5.0 × 2.0–2.5 μ; agar becoming blue-green in some isolates; no odor; on broad-leaved or, rarely, coniferous trees.

2.(5).6.(7).(11).(17).32.36.37.38.39.43.44.(48).54.(55). *Polyporus gilvus* (Schw.) Fr. (Nobles 1948)

Setal hyphae and setae lacking; interlocking hyphae present in some isolates, forming skinlike areas (omitted from description in 1948); mats all white or with scattered areas or lines buff to brown after 3 to 4 weeks, at first slightly raised, woolly, later thicker and opaque; odor sweet; on broad-leaved or, rarely, coniferous trees.

2.6.7.(11).32.36.37.38.39.42.43.50.54.(55). *Hymenochaete corrugata* (Fr.) Lév. (Nobles 1948)

Setal hyphae and setae lacking; interlocking hyphae present, forming skinlike areas (Fig. 56); mats white at first, becoming yellow to fawn and vinaceous in small to large areas, slightly raised, downy to woolly or felty; no odor; on broad-leaved and coniferous trees.

2.6.11.32.37.38.43.54.55. *Hymenochaete tabacina* (Sow. ex Fr.) Lév. (Nobles 1948)

Setal hyphae and setae lacking; cuticular cells and (or) interlocking hyphae present in some isolates, forming small or large pellicular or crustose areas; mats mainly white, slightly raised, floccose-cottony, with more or less extensive colored areas, pellicular to crustose, present in some isolates; odor none in some isolates, faintly of lemons in others, strong and disagreeable in the rest; conidia numerous, borne on oedocephaloid conidiophores (Fig. 81); associated with white rot in coniferous or, rarely, broad-leaved trees.

2.(5).6.7.(10).(11).33.36.37.38.42.(47).50.53.(54).55. *Fomes annosus* (Fr.) Karst. (Nobles 1948)

Setal hyphae and setae lacking; cuticular cells, hyaline at first, brown when mature, in loosely arranged groups or, more frequently, closely packed together to form pseudoparenchymatous areas (Fig. 53); mats with white border, soon changing to cream-buff and brown, at first slightly raised, cottony, becoming woolly to felty, sometimes interrupted by zones in which aerial mycelium consists of thin bloom over crustose areas, these subsequently overgrown with felty mycelium; odor of wintergreen strong; on broad-leaved trees, especially *Betula* spp.

2.6.8.10.32.37.39.42.43.50.54. *Fomes igniarius* var. *laevigatus* (Fr.) Overh. (Nobles 1948)

Setal hyphae and setae lacking; chlamydospores numerous in some isolates, rare or apparently lacking in others, hyaline or brown, concolorous with hyphae in which they are formed, thick-walled, globose to ovoid, 10.5–16.5 μ diameter; mats greenish-yellow to brown, variable, at first with small floccose areas, later with some raised cottony balls, some velvety areas or zones, some areas lacking aerial mycelium and appearing almost metallic; odor pleasant, anise-like; associated with brown cubical rot in coniferous or, rarely, broad-leaved trees.

(1).2.6.7.32.34.37.38.39.42.–44.50.(54).55. *Polyporus schweinitzii* Fr. (Nobles 1948, 1958*a*)

Key Code 2.6.37.44.–46.

Setal hyphae numerous, long, flexuous, curving, 4.5–6.0 μ diameter, tapering to a sharp point (Fig. 98); setae lacking; mats avellaneous and pale brown, at first with scanty aerial mycelium, then cottony, and finally compact-woolly, with scattered small balls or granules, forming a rough surface; odor none; associated with yellow ring rot of coniferous trees.

2.6.18.32.37.38.45.55. *Poria ferrugineofusca* Karst. (Nobles 1948)

Setal hyphae and (or) setae numerous, elongate, pointed, 90.0–200.0 × 4.5–6.0 μ (Fig. 78); mats white at first and remaining so over most of surface or in margin, the rest of the mat yellow to brown, downy to felty, occasionally with slightly more compactly arranged mycelium in sectors; no odor; associated with white rot of broad-leaved or, rarely, coniferous trees.

2.6.17.18.32.37.39.45.–47.54.(55). *Poria ferruginosa* (Schrad. ex Fr.) Karst. (Nobles 1948)

Setal hyphae numerous, usually slender, 4.5–6.0(–7.5) μ diameter; mats white at first, changing to buff, vinaceous, or tawny olive throughout or in certain zones, slightly raised, cottony, becoming somewhat flattened, woolly, or crustose in small areas in some isolates; odor strong and unpleasant at first, then disappearing; associated with yellow ring rot in western coniferous trees.

2.6.18.32.37.38.40.43.44.53.55. *Poria weirii* Murr. (Mounce, Bier, and Nobles 1940; Nobles 1948)

Setal hyphae present, 1.5–7.5 μ diameter (Fig. 95); setae numerous in fruiting areas, the base bulbous and apex pointed, 6.0–9.0 μ diameter (Fig. 75); basidiospores hyaline to yellowish, one-guttulate, ovoid, slightly flattened on one side, 6.0–9.0 × 4.0–4.5 μ; mats white at first, becoming vivid greenish-yellow, at first loosely arranged, cottony, becoming appressed, subfelty and translucent or felty and opaque, forming fruiting areas with irregular pores; on broad-leaved trees, usually *Betula* spp.

2.6.(8).(10).17.18.32.37.38.39.45.–47.48.54. *Poria obliqua* (Pers. ex Fr.) Karst. (Nobles 1948)

Setal hyphae lacking; setae rare in some isolates, lacking in others, small, 23.0–26.0 × 4.0–5.9 μ; brown fiber hyphae numerous; cuticular cells, present in most isolates, brown when mature, closely packed to form pseudoparenchymatous areas (Fig. 52); mats white at first and remaining pale in color with tinges of buff and yellow or becoming deeper yellow or brown, uniformly woolly to felty or with some zones crustose at surface of agar with overgrowth of sparse cottony mycelium; odor of wintergreen slight in some isolates, lacking in others; associated with white rot of broad-leaved trees.

2.6.8.(10).(17).32.37.39.44.45.50.54.60. *Fomes igniarius* (L. ex Fr.) Kickx (Nobles 1948)

Setal hyphae lacking; setae present and fairly numerous in some isolates, apparently lacking in others, small, 16.0–40.0 × 4.0–6.4 μ; cuticular cells, brown when mature, closely packed to form crustose areas; mats of faster growing isolates buff to yellow or brown, at first loosely arranged, cottony, later appressed, woolly to subfelty, occasionally forming poroid fruiting areas; mats of more slowly growing isolates appressed, cottony, thin, allowing dark brown color of agar to show through; no odor; associated with white stringy rot of broad-leaved trees.

2.(5).6.10.(17).32.37.39.44.–47.(48).54. *Polyporus cuticularis* Bull. ex Fr. (Nobles 1948)

Setal hyphae lacking; setae numerous in fruiting areas, 20.0–33.0 × 4.5–7.0 μ (Fig. 74); interlocking hyphae present in some isolates, forming skinlike areas; mats mainly white, slightly raised, cottony, with inoculum and some areas along radiating lines becoming brown, compact, felty to velvety, covered with poroid fruiting surface after 3 or more weeks in some isolates; basidiospores hyaline, oblong-ellipsoid, 4.0–5.0 × 2.0–2.5 μ; agar becoming blue-green in some isolates; no odor; associated with white rot of broad-leaved or, rarely, coniferous trees.

2.(5).6.(7).(11).(17).32.36.37.38.39.43.44.(48).54.(55). *Polyporus gilvus* (Schw.) Fr. (Nobles 1948)

Setal hyphae and setae lacking; brown fiber hyphae usually present; interlocking hyphae present in some isolates forming small clumps or larger skinlike areas; mats yellow or greenish-yellow, the hyphae erect, silky-cottony, zonate, thin enough to allow dark brown color of agar to show through; no odor; associated with white or yellow flaky heartrot of broad-leaved trees, usually *Quercus* spp.

2.6.(7).(8).(11).32.37.39.45.46.54. *Fomes everhartii* (Ell. & Gall.) v. Schrenk & Spaulding (Nobles 1948)

Setal hyphae and setae lacking; brown fiber hyphae usually present; mats with white border changing abruptly to bright golden or mustard yellow, the brighter colors assumed by older cultures being noteworthy, felty and tufted; no odor; associated with spongy yellow heartrot of living *Robinia pseudoacacia*.

2.6.8.32.37.39.44.–46.(48).54. *Fomes robiniae* (Murr.) Sacc. & D. Sacc. (Nobles 1948, as *Fomes rimosus* Berk.)

Setal hyphae and setae lacking; brown fiber hyphae present; mats with white border changing to buff and yellow, the newer growth raised to top of Petri dish, cottony to cottony-woolly,

Key Code 2.6.37.44.–46. (*Concluded*)

loosely arranged, the deepest color in this mycelium, with zone around inoculum collapsed, woolly, white or pale; reverse noteworthy, yellow to brown below the newest growth, subsequently bleached; no odor; associated with white pocket rot of broad-leaved trees, usually *Quercus* spp.

2.6.8.32.37.39.40.44.45.54. *Polyporus dryophilus* Berk. (Nobles 1948)

Setal hyphae and setae lacking; brown fiber hyphae present; mats mainly white, with tinges of rusty brown over inoculum and in scattered flecks or narrow zones, appressed, cottony, showing radiating growth lines or sectors; reverse unchanged in color at first, then bleached; no odor; associated with white rot of broad-leaved and coniferous trees.

2.6.8.32.37.38.40.45.54.55. *Poria ferrea* (Pers.) Bourd. & Galz. (Nobles 1948)

Setal hyphae and setae lacking; brown fiber hyphae with occasional expansions similar to those described for *Fomes pini* (Fig. 72) usually present; mats with conspicuous white border, changing to buff and tawny olive, raised, thick-woolly, nodulose or lacunose, peeling readily from agar; odor fragrant; associated with white rot of *Prunus* spp. and *Crataegus* spp.

2.6.8.26.32.37.38.39.44.–46.50.54. *Fomes pomaceus* (Pers.) Lloyd (Nobles 1948, as *Fomes fulvus* (Scop.) Gill.)

Setal hyphae, setae, and fiber hyphae lacking; interlocking hyphae present forming skinlike areas (Fig. 59); mats white at first, changing to buff and yellow, the newest growth slightly raised, cottony-woolly, somewhat tufted, later appressed, cottony, sparse and allowing dark brown color of agar to show through; no odor; associated with white rot of broad-leaved trees.

2.6.11.32.37.39.43.44.54. *Polyporus radiatus* Sow. ex Fr. (Nobles 1948)

Setal hyphae and setae lacking; brown fiber hyphae with occasional expansions similar to those described for *Fomes pini* (Fig. 72) usually present; interlocking hyphae present, compactly arranged, forming skinlike areas (Fig. 57); mats with broad white margin, changing to buff and brown, usually paler in older parts, raised, cottony to cottony-plumose, collapsed around inoculum, felty to skinlike, fruiting over inoculum after 2 weeks and later in poroid areas or over broad zones where basidia occur in scattered tufts; basidiospores brown, ovoid, 4.5–7.0 × 3.0–4.5 μ; no odor; associated with white pocket rot in *Populus* spp.

2.6.8.11.26.32.37.38.39.44.45.48.54. *Polyporus vulpinus* Fr. (Nobles 1948, as *Polyporus dryophilus* var. *vulpinus* (Fr.) Overh.)

Setal hyphae and setae lacking; brown fiber hyphae with occasional expansions similar to those described for *Fomes pini* (Fig. 72) usually present; interlocking hyphae present, forming skinlike areas; mats with white border, becoming pinkish-buff to tawny olive, raised to top of Petri dish in vicinity of inoculum and gradually sloping to level of agar at margin, thick, woolly, sometimes with layer of mycelium growing across inside of lid of Petri dish; no odor; associated with white rot of broad-leaved trees.

2.6.8.11.32.37.38.45.46.54. *Poria punctata* (Fr.) Karst. (Nobles 1948)

Setal hyphae and setae lacking; chlamydospores numerous in some isolates, rare or apparently lacking in others, hyaline or brown, concolorous with hyphae in which they are formed, thick-walled, globose to ovoid, 10.5–16.5 μ diameter; mats greenish-yellow to brown, variable, at first with small floccose areas, later with some raised cottony balls, some velvety areas or zones, some areas lacking aerial mycelium and appearing almost metallic; odor pleasant, anise-like; associated with brown cubical rot of coniferous or, rarely, broad-leaved trees.

(1).2.6.7.32.34.37.38.39.42.–44.50.(54).55. *Polyporus schweinitzii* Fr. (Nobles 1948, 1958*a*)

Key Code 2.6.37.47.

Setal hyphae numerous to rare, dark brown, pointed, 4.5–9.0 μ diameter, up to 300.0 μ long; setae rare or apparently lacking, 6.4 μ diameter; interlocking hyphae present, forming skinlike areas; mats frequently patchy, white to bright yellow, cottony to woolly, sometimes zonate, the aerial mycelium fairly plentiful, or, in other areas, aerial mycelium sparse, its color masked by the dark brown color of the agar; no odor; associated with white rot and cankers of broad-leaved trees.

2.6.11.17.18.32.37.39.47.54.(55). *Polyporus glomeratus* Peck (Nobles 1948)

Setal hyphae and (or) setae numerous, elongate, pointed, 90.0–200.0 × 4.5–6.0 μ; mats white at first and remaining so over most of surface or in margin, the rest of the mat yellow to brown, downy to thin-felty, occasionally with slightly more compact growth in sectors; no odor; associated with white rot of broad-leaved or, rarely, coniferous trees.

2.6.17.18.32.37.39.45.–47.54.(55). *Poria ferruginosa* (Schrad. ex Fr.) Karst. (Nobles 1948)

Setal hyphae present, 1.5–7.5 μ diameter (Fig. 95); setae numerous in fruiting areas, the base bulbous and apex pointed, 6.0–9.0 μ diameter (Fig. 75); basidiospores hyaline to yellowish,

Key Code 2.6.37.47. (*Continued*)

one-guttulate, ovoid, slightly flattened on one side, 6.0–9.0 × 4.0–4.5 μ; mats white at first, becoming vivid greenish-yellow, at first loosely arranged, cottony, becoming appressed, subfelty and translucent or felty and opaque, forming fruiting areas with irregular pores; on broad-leaved trees, usually *Betula* spp.

2.6.(8).(10).17.18.32.37.38.39.45.–47.48.54. *Poria obliqua* (Pers. ex Fr.) Karst. (Nobles 1948)

Setal hyphae lacking; setae fairly numerous in two isolates, apparently lacking in others, 40.0–60.0 × 4.6–6.2 μ; bulbils or knots of hyphae (22; Fig. 69) numerous and conspicuous; brown fiber hyphae usually present; mats reddish-brown to dull brown, at first slightly raised, cottony-woolly, becoming collapsed and felty, all thin enough to allow darker brown color of agar to show through; no odor; associated with white pocket rot of western coniferous trees.

2.6.(8).(17).22.32.37.39.47.55. *Fomes nigrolimitatus* (Rom.) Egel. (Nobles 1948)

Setal hyphae lacking; setae usually present, especially in velvety areas of mat, slender, pointed, 30.0–67.0 × 4.5–7.5 μ (Fig. 76); brown fiber hyphae with terminal or intercalary expansions up to 7.5 μ diameter, occurring singly or in series, with walls thick and lumen visible only in expansions (Fig. 72); mats white to buff, yellow, or brown, raised, cottony-woolly to woolly, tufted to form a rough surface, occasionally with small areas in which mycelium is appressed, velvety, or lacking so that colored agar is exposed; no odor; associated with red ring rot of coniferous and, rarely, broad-leaved trees.

2.6.8.17.26.32.37.39.47.(54).55. *Fomes pini* (Thore ex Pers.) Lloyd (Nobles 1948)

Setal hyphae lacking; setae fairly numerous in some isolates, apparently lacking in others, 64.0–120.0 × 4.8–6.4 μ; brown fiber hyphae usually present; mats white at first, after 3 or 4 weeks developing scattered or more or less continuous areas near the inoculum or elsewhere, buffy-brown in color, all appressed, farinaceous to thin-felty, minutely tufted; reverse unchanged or with blue-green color that disappears after 3 or 4 weeks; odor strong and unpleasant; associated with white rot of coniferous and broad-leaved trees.

2.6.(7).(8).(17).32.37.38.47.53.54.55. *Fomes viticola* (Schw.) Lowe (Nobles 1948, as *Trametes tenuis* Karst.)

Setal hyphae lacking; setae present and fairly numerous in some isolates, apparently lacking in others, small, 16.0–40.0 × 4.0–6.4 μ; cuticular cells, brown when mature, closely packed to form crustose areas; mats of faster growing isolates buff to yellow or brown, at first loosely arranged, cottony, later becoming appressed, woolly to subfelty, occasionally forming poroid fruiting areas; mats of more slowly growing isolates appressed, cottony, sparse and allowing dark brown color of agar to show through; no odor; associated with white stringy rot of broad-leaved trees.

2.(5).6.10.(17).32.37.39.44.–47.(48).54. *Polyporus cuticularis* Bull. ex Fr. (Nobles 1948)

Setal hyphae lacking; setae rare in some isolates, apparently lacking in others, sharp-pointed, 52.0–60.0 × 7.5–9.0 μ (Fig. 77); fiber hyphae lacking; interlocking hyphae present, forming crustose areas; chlamydospores or chlamydospore-like swellings (Fig. 71) numerous in some isolates, apparently lacking in others, brown, with walls more or less thickened and contents often appearing plasmolyzed or curdled, 7.5–21.0 × 4.5–9.0 μ; mats yellow to brown, appressed, downy to thin-velvety, usually not continuous over surface, the dark brown agar being exposed, frequently with small compact lumps near inoculum or elsewhere, which suggest fruit body fundaments; no odor; associated with white pocket rot of living coniferous trees.

2.6.11.(17).26.34.37.39.47.55. *Polyporus tomentosus* Fr. (Nobles 1948, as *Polyporus circinatus* Fr.)

Setal hyphae and setae lacking; brown fiber hyphae present; cuticular cells present in most isolates, brown when mature, closely packed to form pseudoparenchymatous areas (Fig. 54); mats with white border, changing to buff, bright yellow, and brown, thick-woolly to plushlike, frequently grown to top of Petri dish near inoculum and sloping gradually to level of agar at margin, with characteristic grooves, radiating from inoculum to marginal bays, with crustose areas in some isolates, dark brown with thin white bloom over surface; odor of wintergreen strong; associated with white rot of *Populus* spp.

2.6.8.(10).32.37.38.39.47.50.54. *Fomes igniarius* var. *populinus* (Neuman) Campbell (Nobles 1948)

Setal hyphae and setae lacking; brown fiber hyphae present; interlocking hyphae present, closely packed to form skinlike or crustose areas (Fig. 58); mats variable, all slightly raised, cottony, becoming woolly, tufted, white to cream color or tawny olive, with brown crustose areas, or with sectors in which mat is deep yellow, cottony, sparse, allowing dark brown color of agar to show through, or the whole mat the latter type; no odor; associated with white rot of coniferous trees.

2.6.8.11.32.37.39.47.55. *Poria tsugina* (Murr.) Sacc. & Trott. (Nobles 1948)

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Setal hyphae and setae lacking; brown fiber hyphae rare or lacking; swellings up to 20.0 μ diameter on hyphae of submerged mycelium; mats variable, all white to yellow or olive-ocher, slightly raised, cottony, thin enough to allow darker brown color of agar to show through or white to cream-buff and chamois color, raised, thick-woolly, opaque, or sectored with both types of mat present; no odor; associated with white rot of broad-leaved trees.

2.6.7.(8).26.32.37.39.47.54. *Fomes conchatus* (Pers. ex Fr.) Gill. (Nobles 1948)

Setal hyphae, setae, and fiber hyphae lacking; mats variable, with white and yellowish-brown areas downy to thin-woolly and reddish-brown areas velvety; on broad-leaved trees, usually *Quercus* spp., and western coniferous trees.

2.6.7.32.37.39.47.54.55. *Polyporus dryadeus* Pers. ex Fr. (Nobles 1948)

Setal hyphae, setae, and fiber hyphae lacking; cuticular cells present, hyaline at first and buffy-brown when mature, closely packed to form pseudoparenchymatous areas (Fig. 55); rhizomorphs present; characteristic hyphae with minute hairlike projections on side walls, present in tufts on older parts of mat (Fig. 45); no odor; associated with white butt and root rot of coniferous and broad-leaved trees.

2.6.10.16.20.32.37.39.47.54.55. *Armillaria mellea* (Fr.) Kummer (Nobles 1948)

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